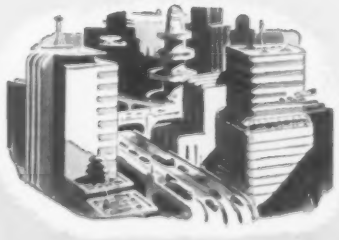
Vol. XIV, No. 11 JUNE, 1945

THE TOOL ENGINEER

OFFICIAL PUBLICATION OF THE AMERICAN SOCIETY OF TOOL ENGINEERS



Machine Tools and Tool Engineering are the Keystone to Mass Production of War Materials

Indispensable!

1 **THE "EYES" OF THE AIR — furnishing 90% of all military intelligence and reconnaissance data.**

Not one square foot of strategic enemy territory escapes the aerial camera's searching, all-seeing eye. Fairchild Camera & Instrument Corporation manufactures the bulk of these vital cameras which must be ruggedly built to withstand all kinds of operating conditions such as extremes of temperature and humidity. Above all, they must be compact and *precision-made* to guarantee swift, clear, and utterly dependable results.

2 **THE MACHINES THAT MAKE THESE "EYES" — precision machines like the P&W VERTICAL MILLER and PROFILER which shapes vital parts to critical tolerances.**

Seating surfaces on film magazine base plates, camera bodies, and lens cones — which must be held to tolerances as close as ±.0003″ — are machined on the Pratt & Whitney Vertical Miller & Profiler (Fairchild has 10 of these in constant operation). If specified tolerances are not held here, the focus of the camera lens would be affected. On precision machining of the many irregular castings, Fairchild uses a double-spindle set-up on this machine.

In vitally important work like this where accuracy and dependability coupled with swift production and low cost are prime requisites, the P&W Vertical Miller & Profiler is proving itself "best for the job" 365 days a year. For full details, write Pratt & Whitney, *Division* Niles-Bement-Pond Company, West Hartford 1, Connecticut.

Putting the "Eye" on the enemy. Army photographer using the Fairchild K17 camera for oblique photography. This same unit is also used for mapping and reconnaissance photography. *U. S. Army Air Force Photo*

Accuracy in Action. For machining the body casting of a K18 camera, Fairchild uses a fly cutter operation on a P&W Vertical Miller and Profiler. This is the critical surface upon which the lens cone is attached and must be accurate.

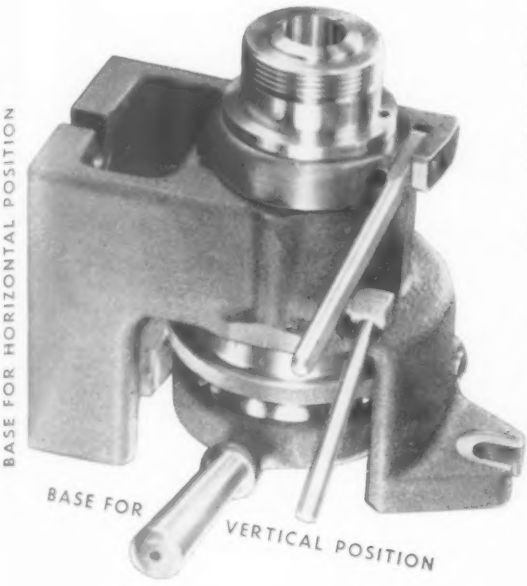
PRATT & WHITNEY

Division Niles-Bement-Pond Company

WEST HARTFORD 1, CONNECTICUT

HARDINGE HORIZONTAL-VERTICAL

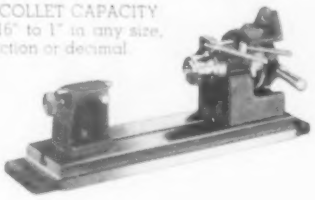
Collet Index Fixtures with Threaded Nose Spindle are fast in operation and hold work accurately



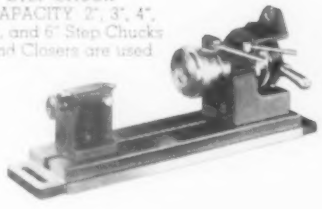
In addition to taking standard collets, this fixture takes step chucks and jaw chucks to cover a wide range of applications. It will eliminate the necessity of your tool room making many specially designed fixtures. Thus, your engineers and tool-makers will have more time for other work.

A preselector arrangement provides the selection of separate indexing of any number divisible into 20 or 24. The collet closer lever has a 100 to 1 leverage for quick opening and closing of collets and step chucks. Write for bulletin.

1" COLLET CAPACITY. 1/16" to 1" in any size, fraction or decimal.



6" STEP CHUCK CAPACITY. 2", 3", 4", 5", and 6" Step Chucks and Closers are used.



5" JAW CHUCK CAPACITY. Universal and Independent Jaw Chucks have 5" cap.

HARDINGE
ELMIRA, N.Y.

HARDINGE-SJOGREN SPEED COLLET CHUCKS

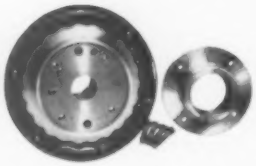
increase production of your lathes and milling machines

A Hardinge-Sjogren Nose Type Speed Collet Chuck enables you to get full value from your toolroom lathes, engine lathes and milling machines. It gives greater capacity, saves time, increases accuracy and assures better results. An almost effortless turn of the handwheel, one way or the other, automatically opens or closes the collet, releasing or gripping the work as desired. Its grip is adjustable and sure. Production is increased as the operator is always in front of his work. Available in three sizes for 1", 1 3/8", or 1 3/4" collet capacity. Write for complete bulletin.

For CAM-LOCK SPINDLES

For TAPERED KEY-DRIVE SPINDLES

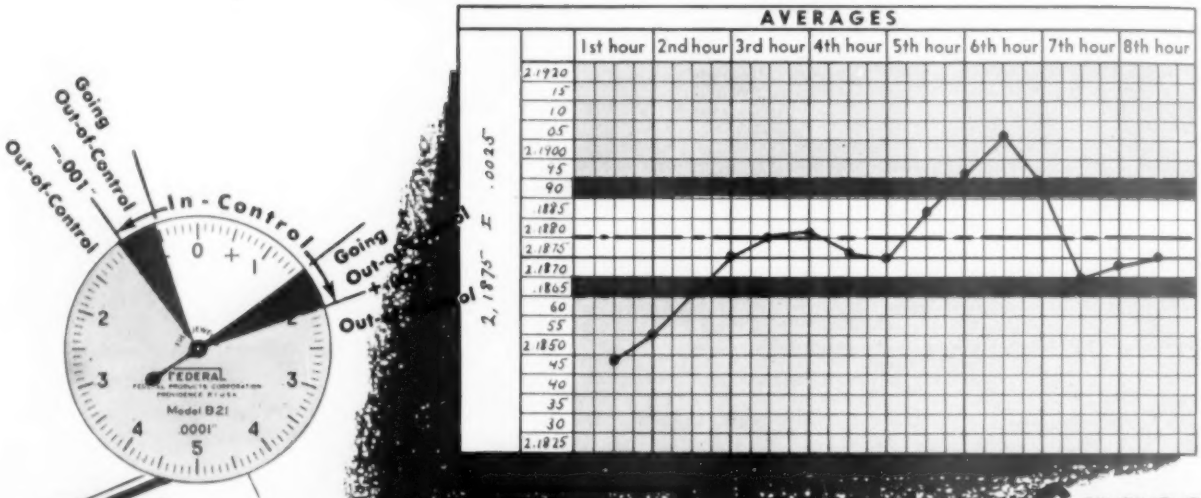
For THREADED NOSE SPINDLES



"PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE"

DIMENSIONAL *QUALITY CONTROL

Locks the Barn Door BEFORE the Horse Is Stolen



Indicating Gages Obtain the Data and Keep Dimensions in Control . . .

Statistical methods of controlling dimensions build quality into the product by employing control over the variables which exist during its production. Only by the use of Indicating Gages is it possible to obtain the necessary data at production. Fixed or old style Gages can't, because they do not tell *how much* the same dimension *varies* in each workpiece.

Much theory has been associated with Statistical Quality Control. Federal has prepared and furnishes a Primer — a simple practical method of applying this modern method of building dimensional quality into your work at production.

Send for a copy.

This Fe... furnishes a simple a... method of *applying* Dimensional Quality Control with the detailed theory eliminated.

* *Quality Control by Statistical Methods.*

FEDERAL PRODUCTS CORPORATION
1144 EDDY STREET **PROVIDENCE 1, R. I.**

★ ★ ★ ★ ★ **FEDERAL** ★

BRANCH OFFICES
Atlanta • Avondale, Ariz. • Chicago
Cleveland • Dallas • Detroit • Greensboro, N. C. • Hartford • Houston
Indianapolis • Los Angeles • Memphis
Milwaukee • Minneapolis • Montreal
New York • Philadelphia • Pittsburgh
Portland, O. • Rochester • San Francisco
Seattle • St. Louis • Toronto
Tulsa • Windsor

PUBLISHED MONTHLY BY

THE TOOL ENGINEER

AMERICAN SOCIETY OF TOOL ENGINEERS

VOLUME XIV — JUNE, 1945 — NUMBER 11

TABLE OF CONTENTS

DEPARTMENTS

SPECIAL NOTICE

The ADVERTISING and EDITORIAL departments of The TOOL ENGINEER have been moved into new and larger quarters. In order to insure prompt handling of correspondence, advertising copy and engravings, all mail and express parcels should be addressed as follows:

The TOOL ENGINEER
550 W. Lafayette Blvd.
Detroit 26, Michigan

Please make the above correction on your TOOL ENGINEER address record now to help avoid possible delays.

The Tool Engineer is published monthly at 1666 Penobscot Building, Detroit 26, Michigan, in the interest of the members of the American Society of Tool Engineers. Advertising and Editorial departments are located at 550 W. Lafayette Blvd., Detroit 26, Michigan. Subscription is $2.00 per year. Non-members $6.00 per year. Application for Second Class Permit pending at Detroit, Michigan.

Directory of A.S.T.E. Chapter Officers

AKRON CHAPTER, NO 47
Melvin P. Erdmann, *Chairman*
174 Portage Drive, Akron 3, Ohio
Alexander H. Ekesy, *Secretary*

ATLANTA CHAPTER, NO. 61
Sydney W. Barnett, *Chairman*
7 11th St. N.E., Atlanta, Ga.
George W. Brown, *Secretary*

BALTIMORE CHAPTER, NO. 13
C. Irwin Hochhaus, *Chairman*
3036 Oak Forest Dr., Parkville 14, Md.
Thomas F. Burke, *Secretary*

BINGHAMTON CHAPTER, NO. 35
Albert J. Pangburn, *Chairman*
556 Hooper Rd., Johnson City, R.D. No. 2, N.Y.
Roland B. Andrews, *Secretary*

BOSTON CHAPTER, NO. 33
Arthur A. Nichols, *Chairman*
% W. H. Nichols & Sons
48 Woerd Ave., Waltham 54, Mass.
Francis H. Leonard, *Secretary*

BUFFALO-NIAGARA FRONTIER CHAPTER, NO. 10
Julius J. Bemb, *Chairman*
164 Durham Ave., Buffalo 15, N.Y.
Arthur S. Twombly, *Secretary*

CEDAR RAPIDS CHAPTER NO. 71
John M. Speck, *Chairman*
1921 8th Ave., S.E., Cedar Rapids, Iowa
John L. Stark, *Secretary*

CENTRAL PENNSYLVANIA CHAPTER, NO. 22
Preston A. Rickrode, *Chairman*
R. D. No. 1, Abbotstown, Pa.
Carey E. Noel, *Secretary*

CHICAGO CHAPTER, NO. 5
Frank A. Armstrong, *Chairman*
Pratt & Whitney Div., Niles-Bement-Pond Co., 565 W. Washington Blvd., Chicago 6, Illinois
Lawrence J. Kollath, *Secretary*

CINCINNATI CHAPTER, NO. 21
C. W. Stricker, *Chairman*
% Auto Sun Prod. Co.
529 Poplar St., Cincinnati 14, Ohio
Joseph Aprile, *Secretary*

CLEVELAND CHAPTER, NO. 3
Joseph I. Karash, *Chairman*
% Reliance E'ec. & Eng'g Co.
1088 Ivanhoe Rd., Cleveland 10, O.
Warren H. Fitzsimmons, *Secretary*

COLUMBUS CHAPTER, NO. 36
Howard F. Volz, *Chairman*
3019 Palmetto Ave., Columbus 4, O.
Charles W. Warner, *Secretary*

DAYTON CHAPTER, NO. 18
George C. Tillotson, *Chairman*
108 South 3rd, Tipp City, Ohio
J. Robert Kuntz, *Secretary*

DECATUR CHAPTER, NO. 58
Harry J. Moffatt, *Chairman*
965 N. University, Decatur, Ill.
Victor R. Farlow, *Secretary*

DETROIT CHAPTER, NO. 1
E. Wayne Kay, *Chairman*
14127 Winthrop Ave., Detroit 27, Michigan
Guy L. Carpenter, *Secretary*

ELMIRA CHAPTER, NO. 24
George N. Morceau, *Chairman*
504 Hart St., Elmira, N.Y.
Floyd B. Allen, *Secretary*

ERIE CHAPTER, NO. 62
William J. Koch, *Chairman*
3820 Trask Ave., Erie, Pa.
Carl A. Eigabroadt, *Secretary*

FAIRFIELD COUNTY CHAPTER, NO. 6
Carl B. Christensen, *Chairman*
297 Putnam St., Bridgeport, Conn.
J. R. Dailey, *Secretary*

FLINT CHAPTER, NO. 68
Michael Skunda, *Chairman*
1813 Stevenson St., Flint 4, Mich.
Harlan T. Pierpont, *Secretary*

FOND DU LAC CHAPTER, NO. 45
Gideon Kane, *Chairman*
916 Allouez Terrace, P.O. Box 581, Green Bay, Wis.
E. J. Kaiser, *Secretary*

FORT WAYNE CHAPTER, NO. 56
Milton A. Kline, *Chairman*
4315 S. Fairfield Ave., Fort Wayne 6, Ind.
Edward K. Burt, *Secretary*

GOLDEN GATE CHAPTER, NO. 28
Louis A. Talamini, *Chairman*
2518 64th Ave., Oakland, Calif.
Ernest C. Holden, *Secretary*

GREATER NEW YORK CHAPTER, NO. 34
Jacob D. Schiller, *Chairman*
1440 East 14th St., Brooklyn, N.Y.
Adelbert H. Tuttle, Jr., *Secretary*

HAMILTON CHAPTER, NO. 42
Harry H. Whitehall, *Chairman*
P.O. Box 200, Hespeler, Ont., Canada
John E. Ball, *Secretary*

HARTFORD CHAPTER, NO. 7
George A. Highberg, *Chairman*
14 Hickory Lane, West Hartford 7, Conn.
Melville L. Merrill, *Secretary*

HOUSTON CHAPTER, NO. 29
H. R. Turner, *Chairman*
1418 Elliott, Houston 3, Texas
L. P. Robinson, *Secretary*

INDIANAPOLIS CHAPTER, NO. 37
Harry L. Boese, *Chairman*
2619 E. 11th St., Indianapolis 1, Indiana
David R. Smith, *Secretary*

KANSAS CITY CHAPTER, NO. 57
H. Robert Brown, *Chairman*
828 W. 72nd St., Kansas City, Mo.
Joseph W. Gallagher, *Secretary*

LAKEHEAD CHAPTER, NO. 59
Stuart Scorer, *Chairman*
217 S. Marks St., Ft. William, Ont., Can.
Dick Cross, *Secretary*

LITTLE RHODY CHAPTER, NO. 53
Joseph F. McGowan, *Chairman*
486 Pawtucket Ave., Pawtucket, R.I.
John H. Williams, *Secretary*

LOS ANGELES CHAPTER, NO. 27
Arthur D. Lewis, *Chairman*
2500 Lorraine Rd., San Marino 9, Calif.
R. Gerald Stronks, *Secretary*

LOUISVILLE CHAPTER, NO. 54
John Thomas, *Chairman*
Box 1860, Louisville, Ky.
Ancil Brown, *Secretary*

MILWAUKEE CHAPTER, NO. 4
A. R. Gieringer, *Chairman*
3862 N. 53rd St., Milwaukee 10, Wis.
Richard Ford, *Secretary*

MONTREAL CHAPTER, NO. 50
Gerald A. Rogers, *Chairman*
4970 Queen Mary Rd., 25 Montreal, Quebec, Can.
Molson M. Hannaford, *Secretary*

MUNCIE CHAPTER, NO. 70
John D. Rovick, *Chairman*
% Michigan Tool Co., Box 1257
Muncie, Ind.
James C. Rutter, Jr., *Secretary*

NASHVILLE CHAPTER, NO. 43
Otis W. Dressler, *Chairman*
% Dressler-White Co.
201 Woodland St., Nashville 6, Tenn.
C. B. Clemetson, *Secretary*

NEW HAVEN CHAPTER, NO. 41
Jack F. Sargent, *Chairman*
131 Church St., Wallingford, Conn.
Alton V. Pollard, *Secretary*

NEW ORLEANS CHAPTER, NO. 60
Edwin E. Graf, *Chairman*
3257 Belfort Ave., New Orleans 19, La.
A. W. Bernhart, *Secretary*

NIAGARA DISTRICT CHAPTER, NO. 65
Henry Hendriks, *Chairman*
126 Merritt St., St. Catherines, Ont., Can.
G. Frederick Bush, *Secretary*

NORTH TEXAS CHAPTER, NO. 51
P. D. Browne, *Chairman*
6411 Lake Circle Dr., Dallas 14, Texas
John A. Lapham, *Secretary*

NORTHERN NEW JERSEY CHAPTER NO. 14
Frank L. Delhagen, *Chairman*
17 Temple Pl., Irvington, N.J.
H. Wilson Ryno, *Secretary*

PEORIA CHAPTER, NO. 31
E. M. Bertschi, *Chairman*
Eureka Knolls, Eureka, Ill.
C. B. Hartsock, *Secretary*

PHILADELPHIA CHAPTER, NO. 15
John W. Noble, *Chairman*
160 Cedarcroft Ave., Audubon, N.J.
William W. Cady, *Secretary*

PHOENIX CHAPTER, NO. 67
Charles W. Clarke, *Chairman*
2214 N. Central Ave., Phoenix, Arizona
Lester J. Phillips, *Secretary*

PITTSBURGH CHAPTER, NO. 8
C. E. J. Brickner, *Chairman*
Westinghouse Electric Corp.
Room 5-G-47, East Pittsburgh, Pa.
W. S. Risser, *Secretary*

PONTIAC CHAPTER, NO 69
C. F. Staples, *Chairman*
1366 Yosemite, Birmingham, Mich.
George F. Bryan, *Secretary*

PORTLAND (MAINE) CHAPTER NO. 46
John M. Johnston, *Chairman*
38 Urquhart St., Rumford, Me.
Charles E. Paige, *Secretary*

PORTLAND (OREGON) CHAPTER, NO. 63
Raymond E. Neils, *Chairman*
Schmitt Steel Co.
2407 N.W. 28th, Portland 10, Ore.
John R. Barrett, *Secretary*

POTOMAC CHAPTER, NO. 48
Lawrence Didszoneit, *Chairman*
511 Woodland Terrace, Jefferson Pk., Alexandria, Va.
Daniel T. Hilleary, *Secretary*

RACINE CHAPTER, NO. 2
Raymond M. Goodsell, *Chairman*
3504 Washington Ave., Racine, Wis.
George Klimt, *Secretary*

RICHMOND CHAPTER, NO. 66
Roland E. Lockridge, *Chairman*
250 S.W. 1st St., Richmond, Ind.
Floyd T. Sykes, *Secretary*

ROCHESTER CHAPTER, NO. 16
Earle W. DeBisschop, *Chairman*
241 Plymouth Ave. S., Rochester 8, N.Y.
Donald F. Kohler, *Secretary*

ROCKFORD CHAPTER, NO. 12
Walter R. Lustig, *Chairman*
519 Pearl St., Rockford, Ill.
Ernst A. Norrman, *Secretary*

ST. LOUIS CHAPTER, NO. 17
Willis G. Ehrhardt, *Chairman*
% Ehrhardt Tool & Mach. Co.
914 Monroe St., St. Louis 7, Mo.
Robert W. Boehlow, *Secretary*

SAN DIEGO CHAPTER, NO. 44
W. F. Asmus, *Chairman*
2905 Bancroft St., San Diego 4, Calif.
Jerome J. Groff, *Secretary*

SCHENECTADY CHAPTER, NO. 20
E. H. Girardot, *Chairman*
% Gen. Elec. Co., Bldg. 43
Schenectady 5, N.Y.
N. Y. Coxe, *Secretary*

SEATTLE CHAPTER, NO. 39
A. G. Means, Jr., *Chairman*
96 S. E. Place, Mercer Island, Seattle, Wash.
Kenneth Bergerson, *Secretary*

SOUTH BEND CHAPTER, NO. 30
P. W. Winkelmann, *Chairman*
1260 Woodward Ave., South Bend 16, Ind.
James L. Kemp, *Secretary*

SPRINGFIELD (ILLINOIS) CHAPTER, NO. 64
John V. Javorsky, *Chairman*
1401 Lowell Ave., Springfield, Ill.
Lawrence T. Kraus, *Secretary*

SPRINGFIELD(MASS.) CHAPTER, NO. 32
Edward J. Stone, *Chairman*
Westinghouse Electric Corp.
653 Page Blvd., E. Springfield, Mass.
Owen C. Stevens, *Secretary*

SYRACUSE CHAPTER, NO. 19
Emiel J. Floring, *Chairman*
208 Briarcliff Rd., R.D. No. 3, East Syracuse, N.Y.
Lester H. Collins, *Secretary*

TOLEDO CHAPTER, NO. 9
Samuel W. Burgess, *Chairman*
915 Keil Road, Toledo 7, Ohio
Roy J. Dusseau, *Secretary*

TORONTO CHAPTER, NO. 26
R. Eric Crawford, *Chairman*
4 Norma Crescent, Toronto 9,
John B. Burk, *Secretary*

TRI CITIES CHAPTER, NO. 23
A. L. Geiger, *Chairman*
806 E. 13th St., Davenport, Iowa
Lennart N. Dahlen, *Secretary*

TWIN CITIES CHAPTER, NO. 11
Wallace A. Ahlberg, *Chairman*
1041 Jessie St., St. Paul, Minn.
Walter H. Erskine, *Secretary*

TWIN STATES CHAPTER, NO. 40
George R. Morin, *Chairman*
31 Woolson Ave., Springfield, Vt.
William C. Hadfield, *Secretary*

WESTERN MICHIGAN CHAPTER, NO. 38
Thomas E. Newby, *Chairman*
715 Fuller Ave. S.E., Grand Rapids 6, Mich.
H. W. Young, *Secretary*

WICHITA CHAPTER, NO. 52
Harry Giwosky, *Chairman*
547 South Crestway, Wichita 9, Kansas
Leslie R. Glassburner, *Secretary*

WILLIAMSPORT CHAPTER, NO. 49
J. Harold Shafer, *Chairman*
R.D. No. 1, Cogan Station, Penna.
Stanley Barendt, *Secretary*

WINDSOR CHAPTER, NO. 55
Cecil G. Sampson, *Chairman*
2372 Windermere, Windsor, Ont.
P. O. Harrison, *Secretary*

WORCESTER CHAPTER, NO. 25
F. William McQueston, *Chairman*
Union St., Barre, Mass.
Carl D. Schofield, *Secretary*

STANDARD

Announcing

DuBo

The Better PLUG GAGE

FIXED LIMIT TYPE

PATENTS PENDING

Newest Development in Simple, Precise, Effortless BORE GAGING

Again STANDARD pioneers in producing DuBo, newest, most completely satisfactory bore checking gage of the fixed limit type yet produced. DuBo brings to bore gaging new, effortless, finger-tip control, assured precision and speed far beyond the scope of ordinary plug gages . . . whether used by skilled or unskilled workers. Vivid color bands unmistakably identify "go" and "not go" members; unusual lightness and balance minimize fatigue and fatigue-errors; simple manipulation makes DuBo ideal for use at bench or machine.

Simple, yet Precise... Light, yet Sturdy

EASY TO USE... TELLS MORE

Spherical shape, ingenious chamfering and relief, make entrance easy, gaging positive.

★

May be entered into bores actually smaller than gage diameter without forcing or marring work piece.

★

"Go" and "not go" color signals prevent confusion, fumbling, wasted motions, faulty readings.

★

Chamfer edge helps clean bore and prepares clean surface for accurate gaging.

★

Finger-tip "feel" and control reveal true internal conditions at any point in bore.

★

Reveals out - of - roundness, taper, belling and dimensional deviations by unmistakable tilt of handle.

★

May be used in deep bores and close to bottom of blind bores.

Write! Send NOW for illustrated DuBo bulletin . . . tells all about this remarkable new gage.

STANDARD GAGE CO., Inc.
Pouahkeepsie. N.Y.

How Much is .000,000,25 of an inch?

Not even a laboratory microscope could discern it! But this new machine is so sensitive to vibrations produced by unbalance that it can *feel* and *indicate* a workpiece bearing displacement as minute as one four-millionth of an inch—¼ of a micro-inch!

THE NEW GISHOLT DYNETRIC* MICRO-BALANCER

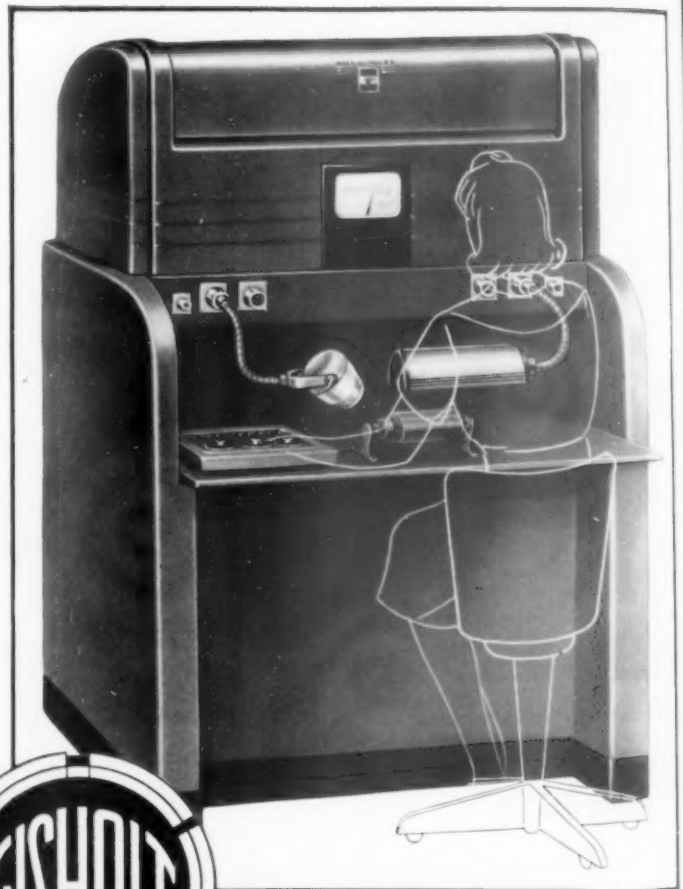
Here precision is carried to a degree never before known in the field of dynamic balancing. Here a displacement of .000,000,25″ due to unbalance vibrations causes the indicating needle to move approximately one-half inch.

The Micro-Balancer was designed especially for balancing parts at any speed up to 36,000 r.p.m.

Where desired, the workpiece can be driven by its own source of power. For example, an air-driven gyro rotor can be driven by an air jet. Or a high-speed, high-frequency motor can be balanced in its own housing and running under its own normal power source.

The new Dynetric Micro-Balancer is another example of Gisholt's ability to balance any rotating part. This unquestioned leadership is at your command.

**A development of Westinghouse Research Laboratories and Industrial Electronics Division.*



THE DYNETRIC MICRO-BALANCER *is available in two basic models: Type H for locating and measuring unbalance in parts supported with rotational axis in a horizontal plane and Type V—for workpieces supported vertically. Literature on request—specify Form 1099.*

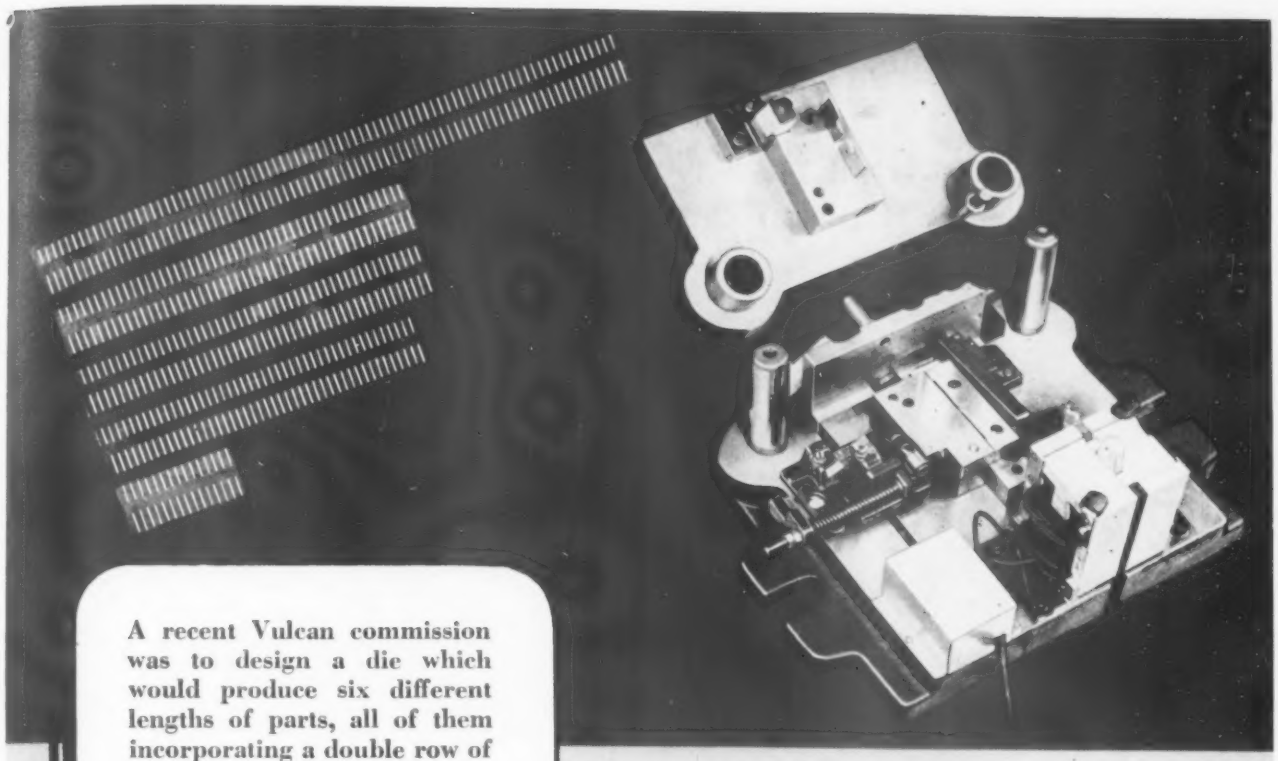
GISHOLT

GISHOLT MACHINE COMPANY

1257 East Washington Avenue • Madison 3, Wis.

Look Ahead . . . Keep Ahead . . . With Gisholt

TURRET LATHES • AUTOMATIC LATHES • BALANCING MACHINES • SPECIAL MACHINES



A recent Vulcan commission was to design a die which would produce six different lengths of parts, all of them incorporating a double row of slots spaced 0.156 in. on centers. The number of slots in the various pieces ranged from 17 to 84. So that one tool could be used for the production of all parts required, the die was fitted with a change-gear indexing device, which trips a relay after the required number of slots have been cut. Thereupon, a push-down solenoid core actuates a cut-off blade.

Let's take an example

What company puts a touch of cleverness into tools which makes them so speedy and accurate that they give the purchaser a special manufacturing advantage?

Perhaps the question is best answered by showing the above example. Vulcan special tools will fit *your* special needs as the die illustrated so happily fits the needs of the radio manufacturer who delegated its designing to Vulcan.

ASK FOR THE BROCHURE

The VULCAN TOOL *Co.*

213 NORTH BECKEL STREET DAYTON 3 OHIO

ENGINEERING • PROCESSING • DESIGNING • BUILDING
TOOLS • DIES • JIGS • GAUGES • SPECIAL MACHINERY

NATIONWIDE *Lovejoy Service*

Lovejoy offers nationwide sales and service for its outstanding line of inserted blade cutting tools. The representatives listed here are completely equipped to solve your milling and cutting problems. They have the know-how and engineering background that can save you time and money. Call on them — or, as a start, write to them for the new Lovejoy Catalog.

1 Almquist Brothers & Viets
2300 East 49th Street
Los Angeles 54, California

2 E. S. Atkinson Company
301 West Twelfth Street
Erie, Pennsylvania

3 Mr. John DiEugenio
Box 1465
Avondale, Arizona

4 Joseph C. Fletcher
1415 Folsom Street
San Francisco 3, California

5 Mr. Malcolm Grant
2543 Arunah Avenue
Baltimore 16, Maryland

6 Mr. Walter F. Greene
658 Fairfield Avenue
Indianapolis 5, Indiana

7 Don Hall Tool Company
Office 2223
20 North Wacker Drive
Chicago 6, Illinois

8 Harris Pump & Supply Company
Brady & Sidney Streets, S. S.
Pittsburgh 3, Pennsylvania

9 C. J. Harter Machinery Company
4000 Clay Avenue
Houston, Texas
or
1401 Gulf States Building
Dallas 1, Texas

10 Richard Ives Company
Corner Colfax & Welton
Facing Speer Boulevard
Denver, Colorado

11 Don F. Johnson Company, Inc.
50 Pearl Street
Buffalo 2, New York

12 Mr. G. E. Jones
15366 Kentucky Avenue
Detroit 21, Michigan

13 Mr. William H. Jones
35-15 78th Street
Jackson Heights, New York

14 Harry C. Kettelson, Inc.
515 East Buffalo Street
Milwaukee 2, Wisconsin

15 Mr. M. J. Lloyd
4500 Euclid Avenue
Cleveland 3, Ohio

16 Murray-Baker-Frederic, Inc.
620-630 South Peters Street
New Orleans, Louisiana

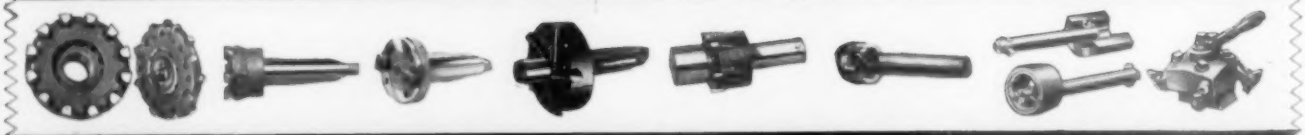
17 Production Products Company
534 First Avenue South
Seattle 4, Washington

18 Kurt P. Wesseling Company
1221 Locust Street
St. Louis, Missouri

19 George E. Zwiefel & Company
1123 N. W. Glisan Street
Portland 9, Oregon

New England & Northern N. Y. State—Home Office or D. H. Proctor, 130 Boulevard, West Springfield, Mass.

Lovejoy TOOL COMPANY, Inc., SPRINGFIELD, VT., U.S.A.



MILLING CUTTERS | BORING HEADS | ARBORS | SPOT FACING TOOLS | COUNTERBORES | BORING BARS | SINGLE POINT TOOLS | TURRET TOOL POSTS

A few simple rules to conserve carbide tools

FIRTHITE FIELD SERVICE POSTERS are available for display in your plant

The conservation of carbide tools through proper handling and correct usage is essential not only in war time but at any time for best production results and low operating costs.

These Firthite field service posters will help remind your plant operators in simple, easy-to-take, understandable manner, of the right way to make carbide tools do their utmost.

Fill in and mail the coupon for your set of these free, 17" x 22", four-color posters.

Firth-Sterling
STEEL COMPANY
OFFICES: McKEESPORT, PA. • NEW YORK • HARTFORD • PHILADELPHIA • PITTSBURGH • CLEVELAND • DAYTON • DETROIT • CHICAGO • LOS ANGELES

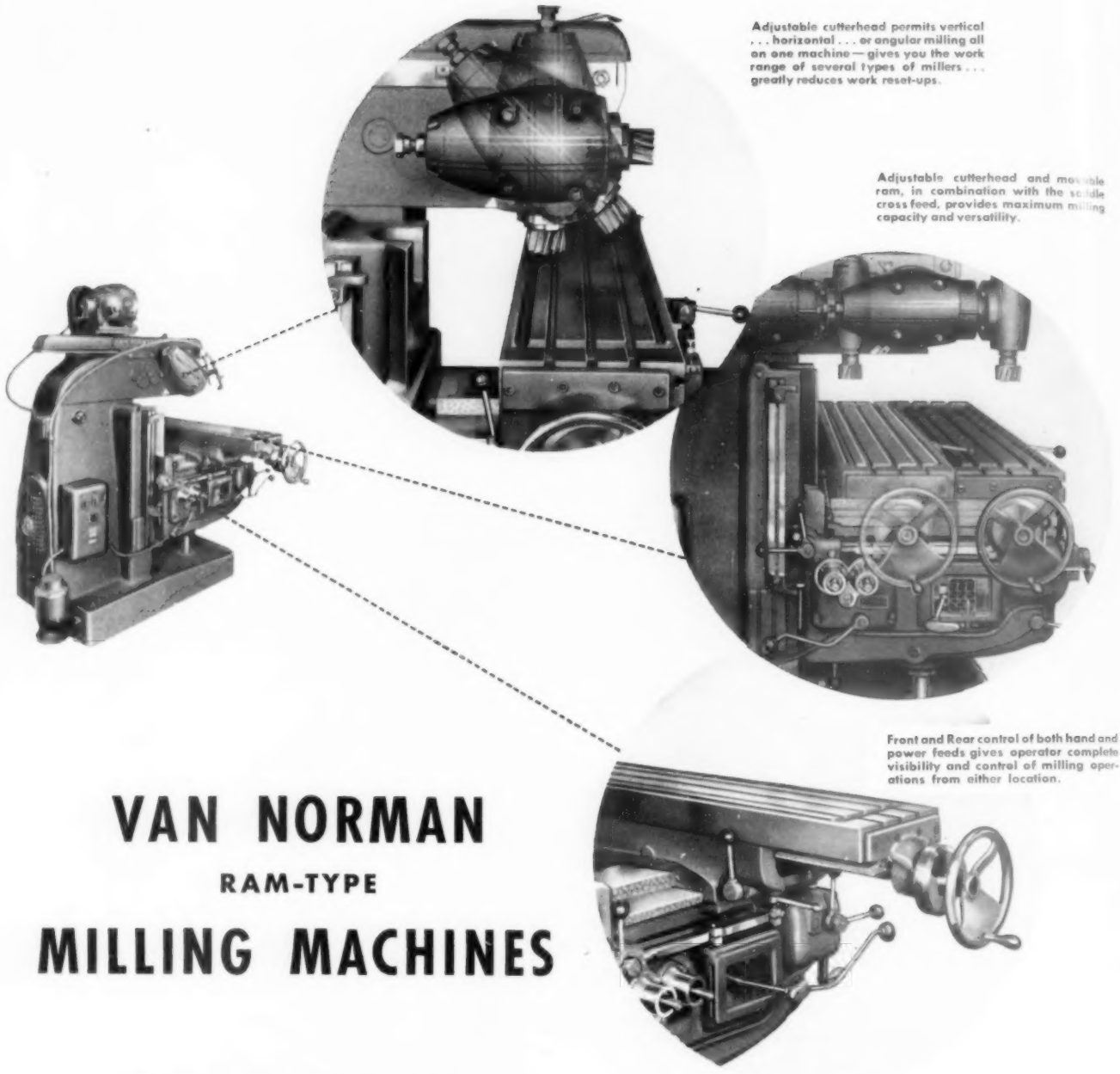
FIRTH-STERLING STEEL CO., Dept. TE—McKeesport, Pa.

Please send us without obligation on our part_____ sets of Firthite Field Service Posters which we wish to display in our plant shops.

NAME _____ TITLE _____

COMPANY _____

ADDRESS _____



Adjustable cutterhead permits vertical . . . horizontal . . . or angular milling all on one machine — gives you the work range of several types of millers . . . greatly reduces work reset-ups.

Adjustable cutterhead and movable ram, in combination with the saddle cross feed, provides maximum milling capacity and versatility.

Front and Rear control of both hand and power feeds gives operator complete visibility and control of milling operations from either location.

VAN NORMAN

RAM-TYPE

MILLING MACHINES

Give Your Operators

Every Advantage in Tool Room and General Purpose Milling

The new Van Norman Ram-Type milling machines will not only do your present war work for you but will also *fit into your production scheme when you reconvert.*

Whether you need one or a dozen, each of these versatile millers gives you the working capacity of three machines. The adjustable cutterhead enables your operator to do vertical, horizontal or angular milling. This means that work re-setups are minimized since most jobs can be carried through completion in the original setup.

If most of your work is general purpose milling, then each day brings various types of milling work. One period mostly horizontal, another vertical, etc. This is when the Van Norman millers prove their worth because the adjustable cutterhead permits you to meet the fluctuating milling needs. It enables you to keep them operating continuously, saving you money by eliminating idle machine time so often encountered with single purpose machines.

In addition, such advantages as front and rear control of both manual and power feeds, directional control of all power feeds, single lever feed selector, sturdy column, base, table and knee assembly assure simplicity of operation, accuracy, and reduce rejects. Van Norman Ram-Type millers are available with plain or swivelling tables. Write for information.

VAN NORMAN COMPANY

Springfield 7, Massachusetts

"It pays to Van Normanize"

IF YOU PLAN FOR TOMORROW • • CONSULT LAPOINTE TODAY

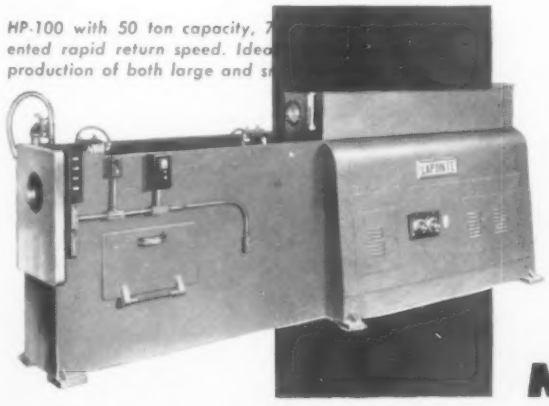
TOMORROW'S TRIM CRAFT WILL BE BETTER BOATS BECAUSE OF BROACHING

Manufacturers with a keen eye to future market dominance have completed postwar plans . . . in which broaching will play a leading role — increasing speed, quantity and quality of production.

Boats are but one of thousands of products that will benefit through the operation of Lapointe designed broaches and broaching machines. Almost any precision part can be produced quicker, cheaper and better — by broaching. Little wonder, then, so many manufacturers have consulted the Lapointe engineering staff.

If you desire to double-check the possibility of broaching in your plant . . if you are seeking a profitable saving in time, space and money in the mass-production of precision parts . . . tell your story to Lapointe — leader in broaching for nearly half a century. Following a painstaking analysis of both your product and plant, you'll receive a recommendation certain to brighten your manufacturing future.

HP-100 with 50 ton capacity, 7
ented rapid return speed. Idea
production of both large and s



THE Lapointe

MACHINE TOOL COMPANY

HUDSON, MASSACHUSETTS • U S.A

THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHES AND BROACHING MACHINES

CHECK ANOTHER SUPER "FIRST"

NOW . . . Solid Tungsten Carbide Reamers Available from Stock!

Good news for users of small reamers! Super Tool Company now stocks solid tungsten carbide reamers in sizes down to .125". Now you can order these small size reamers and get quick deliveries without the delays that resulted when they had to be manufactured on special order.

And here is more good news! Because of Super Tool's advanced manufacturing techniques these small solid tungsten carbide reamers now can be furnished on special orders in sizes as small as .09375".

Next time you need small size reamers, specify SUPER . . . and get the better performance, the cleaner cuts, the precision work and the greater production economies that Tungsten Carbide can bring to your cutting jobs.

Write TODAY for complete data and prices on Super Standard Solid Tungsten Carbide Reamers.

Whatever
YOUR CUTTING JOB
LOOK *FIRST* TO
SUPER

★

CARBIDE TIPPED TOOLS FOR

Turning, Facing
Reaming Forming
Spot Facing
Boring Grooving
Grinder Rests
Wear Parts
Counterboring
Shaving Centers and Special Purposes

SUPER TOOL COMPANY

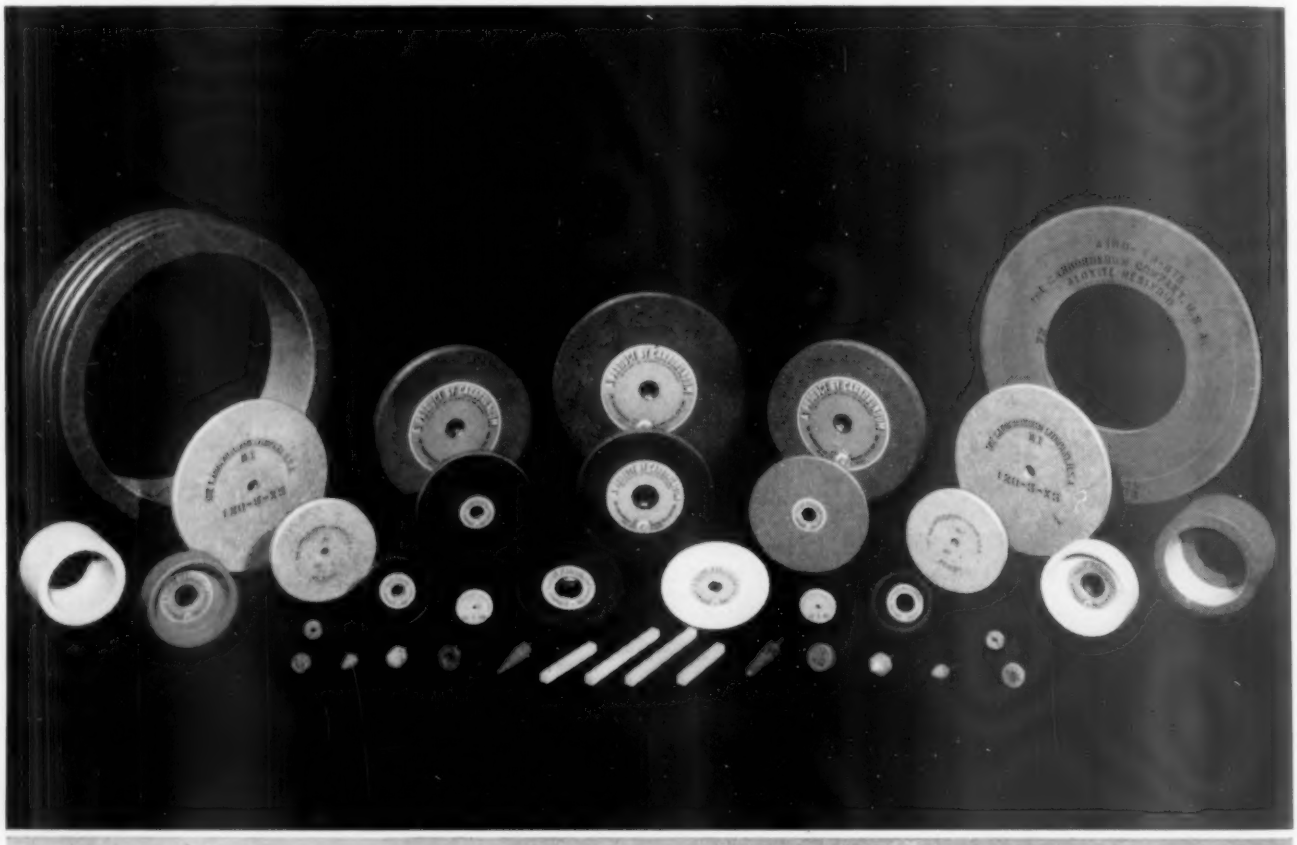
Carbide Tipped Tools

21650 Hoover Road, Detroit 13, Michigan ★ 4105 San Fernando Road, Glendale 4, California

IF IT'S AN ABRASIVE TOOL . . . "CARBORUNDUM" MAKES IT !

EVERY once in a while, somebody tells us that the reason he's not using an Abrasive by "CARBORUNDUM" on a particular job is because "CARBORUNDUM" doesn't make an abrasive product for that job. That always surprises us. For actually there's an abrasive product by "CARBORUNDUM" for all abrasive applications used by modern industry. You see, The Carborundum Company pioneered the use of man-made abrasives. For over half a century, "CARBORUNDUM" abrasive engineers have been working with tool and production engineers and others in industry to help perfect better ways of doing things through the effective use of abrasive tools.

Today, Abrasives by "CARBORUNDUM" are used in almost every industry and for a multitude of purposes. Many users specify these products for all their requirements. Whenever you need help with your abrasive problem call the "CARBORUNDUM" representative. The Carborundum Company, Niagara Falls, N. Y.



THERE IS A PRODUCT BY

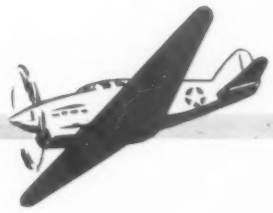
CARBORUNDUM

TRADE MARK

FOR EVERY ABRASIVE APPLICATION

("CARBORUNDUM" is a registered trade mark of and indicates manufacture by The Carborundum Company)

another Baker installation FOR INCREASED PRODUCTION of airplane engine crankcases



Handling four operations on one set-up, this Baker vertical multiple spindle drilling and counterboring machine speeds up production on upper crankcase halves for 12-cylinder aircraft engines.

Operations consist of drilling 14 holes, .691" dia., and then counterboring them to .6875" dia., in each of two banks or faces of the crankcase.

Fixture is mounted on a hydraulically operated in-and-out slide which moves fixture and work to front for loading and unloading, to first station under 14 drilling spindles, then to rear station under 14 counterboring spindles. Fixture is pivot mounted for indexing work at proper angle to handle operations on both banks or faces.

With only one set-up required for four operations, production is increased and floor-to-floor time considerably reduced.

Maximum production capacity, long life and lasting precision are assured by these features:

1. Twin pull cylinder construction, applying feeding and rapid traverse pressures from both sides of multiple head saddle carrier, with feed pressure taken to solid base and to foundation.
2. Simplified direct-coupled motor drive to 28-spindle head, with motor mounted directly above head in ample size heavy saddle head bracket.
3. Lubricating pump in multiple head provides ample lubrication of all gears and bearings; sight glass at front shows at all times whether head is being properly lubricated.
4. All cutting tools are supported in bushings directly above the cut; bushings are mounted in a support plate carried from head of machine to locating plug arrangement which locates bushing plate directly from crankcase bores.
5. Flat ways are precision ground, as on all Baker vertical hydraulic feed machines. Baker recently installed one of the largest size Thompson grinders for this precision work.

● Baker production engineers will be glad to work with you in solving your drilling, tapping, reaming or counterboring problems. Phone, wire or write for this consultation service—no obligation.

Baker Bros. Inc. Toledo 10, Ohio

May we send you complete details on each of these actual production grinding operations? Just use the handy reply form provided below. Results like these are being enjoyed regularly in many leading plants employing this truly revolutionary grinding process. On request, a Quaker Process Engineer will be pleased to call and apply the QUAKER MICROGRIND PROCESS on the toughest grinding job in your shop and explain the radically different principles involved.

QUAKER CHEMICAL PRODUCTS CORP.

CONSHOHOCKEN, PA.

Other Plants in CHICAGO and DETROIT Warehouse Stocks in Principal Industrial Centers

A Progressive Organization of Research and Process Engineers and Manufacturing Chemists

Name_____ Position_____

•••PLEASE PRINT COMPANY NAME AND ADDRESS IN MARGIN BELOW•••

The ASTE Comes Into Its Own

BACK in the early days when the ASTE was more or less a local club, our organization was pretty well ignored by other Technical Societies. They believed, and they had their own experience to support their beliefs, that men concerned with the engineering of production or tooling were by nature inarticulate and always would be. What they did not realize was that whether or not we were inarticulate as individuals, we certainly are not as a group.

The ASTE itself is proving that. From a small group localized in Detroit, it expanded into a truly International Society capable of serving the interests of Tool Engineers in Canada and the United States interested in everything from breadmaking and stoves to aircraft and nuts and bolts.

During the years, its membership skyrocketed as more and more Tool Engineers saw that this ASTE of ours was potentially more than a Technical Society —that it represented the birth of a new PROFESSION.

Now, with a membership on a par with those of the oldest Engineering Societies in the Nation, with a publication of our own to serve our needs as members of this new Profession, the ASTE is coming into its own. Today we speak with a voice 18,000 strong.

We are today at the turning point. The ASTE will continue to grow, but it does not *need* to grow in numbers in order to justify itself to Industry and the Nation. That is done. From here on, the job of the ASTE is to concentrate on fulfilling its obligation to its membership:

To Achieve and Maintain the Full Recognition Which Tool Engineering Deserves as a Profession and to Make Membership in the ASTE of Greater Value to Every Individual Member.

We have just concluded a three-day (morning, noon and night), joint session of the Executive Committee, the Organization Progress Committee, and Chairmen of the various National Committees. That meeting may well turn out to be a milestone in ASTE history.

If there was a question in any of our minds before, there isn't any now. The ASTE has rolled up its sleeves and gone to work to justify *by deeds* its responsibilities to all those who have placed their faith in it—from the founders to the last Tool Engineer to become a member.

The ASTE is coming into its own.

C. V. BRINER,
President, 1945–46

By Guy Hubbard

The Human Side of Tool Engineering

Inspiring history of honored profession dates back to King Solomon's time—amazing growth in last 150 years

IN THIS DAY and age there are no geographical or racial barriers to ingenuity, skill and industrial development. When I was a youngster, the old-timers used to tell me that Cincinnati and Ohio generally was "too far west" for super-extra machine tool building. Later, when I got to Cincinnati, I discovered that the old-timers there somehow had gotten hold of the magic formula, but were sure that those builders who in the meantime had sprung up out in Rockford, Ill., didn't have quite what it took. When I went to Rockford, I found that somehow they too had mastered the art but were positive that machine tools never could be built west of the Mississippi River. They were wrong too. Good machine tools now are being built in California.

Guy Hubbard, lecturer, author and Machine Tool Editor of *Steel* magazine, was born at Windsor, Vt., and educated at Kimball Union Academy and New Hampshire State College. He has worked as a mechanical engineer and consulting engineer for well-known machine tool producers, and as a technical adviser to the U.S. Government.

What do tools mean to the human race? Thomas Carlyle, a somewhat dour Scottish author, answered that question more than a century ago, and in no uncertain terms. Here is what the Sage of Chelsea said:

"Man is a Tool-using Animal. Weak in himself, and of small stature, he stands on a basis—at the most, for the fattest soled—of some half square foot, insecurely enough; has to straddle out his legs, lest the very wind supplant him. Feeblest of bipeds! Three quintals (336 pounds) are a crushing load for him; the steer in the meadow tosses him aloft like a waste rag.

"Nevertheless, he can use tools, can devise tools: With these the granite mountain melts into light dust before him; the seas are his smooth highway; the winds and fire his unwearying steeds. Nowhere do you find him without tools; without tools he is nothing, with tools he is all."

Known in Ancient Times

So much for the basic importance of tool engineering to the human race. Now what of its history? With the help of a Gideon Bible at the Parker House, I have been able to trace your profession—and your skill in prefabrication of parts—back to the time of King Solomon. In the First Book of Kings, Chapter 5, Verse 6, Solomon writes to King Hiram of Tyre as follows: "Now therefore command thou that they hew me cedar trees out of Lebanon; and my servants shall be with thy servants; and unto thee will I give hire for thy servants according to all that thou shalt appoint; for thou knowest that there is not among us that has skill to hew timber like unto the Sidonians."

Then in Verses 17 and 18 the narrative continues thus: "And the King commanded, and they brought great stones, costly stones, and hewed stones, to lay the foundations of the house.

"And Solomon's builders and Hiram's builders did hew them, and the stone squarers: so they prepared timber and stones to build the house."

The First Prefabricated Job

Now, in Chapter 6, Verse 7, we learn how it all worked out. "And the house, when it was in building, was built of stone made ready before it was brought thither; so that there was neither hammer nor ax nor any tool of iron heard in the house, while it was in building."

There you have a successful case of subcontracting in which the parts fitted in a manner which would warm the heart of many machine tool builders in whose assembly departments the sounds of chipping and filing and incidental "cussing" bearing thereon have been heard even in our time.

What about the tool engineer, the man of whom it is written in Isaiah 54, 16, "Behold I have created the smith that bloweth the coals in the fire and that bringeth forth an instrument for his work?" Did he allow himself to be the forgotten man? Indeed he did not.

When the temple was finished, King Solomon gave a feast to the artisans who had participated in its construction. When the throne was unveiled, there was the tool engineer

FIG. 1. King Solomon and the Toolmaker.

sitting in the chair of honor at the right of the king's seat—before that place of honor had been awarded to anyone. As the angry crowd surged forward, King Solomon restrained them, saying, "Let him speak." Whereupon the supposed usurper said, "Thou hast, O King, invited all craftsmen but me. Yet how could these builders have raised the temple without the tools that I have fashioned?"

"True," was the verdict of King Solomon, "The seat is his of right. All honor to the iron worker."

Not only is this craft one of the oldest, but also it is the one mentioned most frequently in legend and in history.

FIG. 2. Bronze calipers and dividers used by Roman engineers and draftsmen in Pompeii, about 79 A.D.

The predominence of the surname "Smith" and its variants in every language, itself is a tribute to the importance of this profession through the ages. To the Romans, a volcano was the chimney of the forge of Vulcan. Among the early Scandinavians thunder and lightning were believed to be produced by Thor hurling his huge blacksmith's hammer. These are only two out of scores of comparable myths.

"Aristocrats of Metal Working"

Among the craftsmen of the Middle Ages, Armorers—who were highly developed smiths, the tool engineers of those times—were rated as the aristocrats of metalworking. Kingdoms were won through the excellence of the weapons and the armor forged by some of the masters of this art. A kingdom was reported to have been lost "for want of a horseshoe nail" carelessly set by a smith unworthy of the name.

Iron workers stood shoulder to shoulder with those who won and held the earliest "beachheads" on our own shores. The ring of the anvil mingled with the sounds of ax and adze as the forest barriers were pushed back. In New England, as early as 1642, Joseph Jenks, late of the old metalworking city of Hammersmith, England, was backed by Governor Winthrop in the establishment of an iron works near a "bog iron ore" deposit at Lynn, Massachusetts.

Because of their virtual isolation from the industrial centers of Europe, the pioneers here in America had to make things for themselves—or go without. Had they been content to go without, or had they been without initiative and the "will-to-work" demanded for solution of new and difficult problems, they or their immediate forbears would not have pulled up stakes in Europe to migrate to America.

Many Pioneers Were Iron Workers

Blessed with active minds and a lot of physical energy, and literally surrounded by raw materials—great trees waiting to be worked up into lumber for building houses and furniture, and rich deposits of "bog ore" waiting to be dug out, dried like peat, smelted by charcoal, and cast into kettles, fireplace fittings, etc.—the American pioneers lost no time in taking advantage of their industrial opportunities. Neither the hard work involved nor the restrictive Townsend Act deterred them.

That notorious Townsend Act set forth: "That from and after the twenty-fourth day of June, one thousand and seven hundred and fifty, no Mill or other Engine for slitting or rolling of Iron or any Plating Forge to work with a Tilt Hammer, or any Furnace for making Steel, shall be erected or after such Erection continued in any of His Majesty's Colonies in America."

Any such iron works was "To be deemed a common Nuisance" and "abated" by the Governor and other colonial officials "under penalty of 500 pounds for neglect, also disability to hold or enjoy any Office or Trust under His Majesty, his heirs or successors."

The purpose of this drastic Act, which so little took into account difficulties of transportation of that day, or the mechanical needs and mechanical inclinations of the American colonists, was to protect jealous British industrialists by stunting the alarming growth of iron and steel manufacture in the Colonies.

Contributed to American Revolution

Just how much the Townsend Act, along with some eight other Acts referring to and restricting Colonial industry and commerce, actually checked the development of early American manufactures is a debatable question. Their effect, however, in eventually bringing on the American Revolution is unquestioned. We hear much these days of a war for the Four Freedoms. Let's not overlook the fact that a Fifth Freedom—a typical Yankee Freedom—was involved in the War of the Revolution. That was, in large measure, a war for Industrial Freedom.

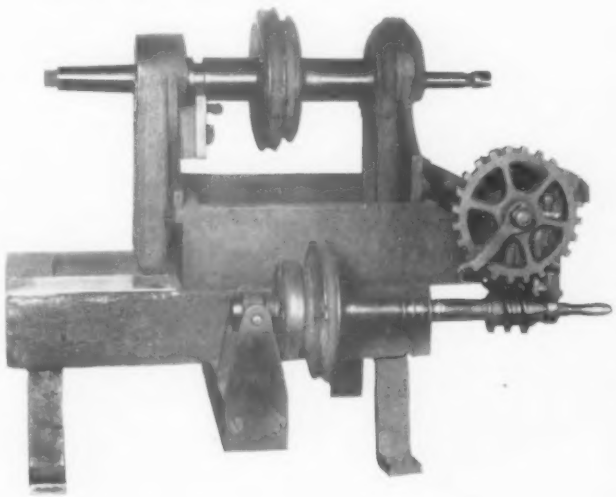
It is extremely difficult to prevent a natural born mechanical genius from "playing around with tools." Ill advised and bungling King George the Third learned the hard way that it is impossible to keep a whole nation of mechanical geniuses from "playing around with tools."

Before "things" can be made, "tools" must be made with which to make them. The earliest axes, adzes, saws, auger bits, etc., used in the American wilderness were brought over from Europe. Beyond that, however, and aside from importations of tool steel which did continue for many years, Americans soon managed to a large degree to "go it alone"—making their own tools to their own original, practical and highly ingenious designs.

Mechanization Thrives in Democracy

There is a definite connection between our cherished democratic form of government and the mechanization of industry in our country. Throughout the centuries great minds in the Old World envisioned both of these ideas and sensed their tremendous possibilities. Most of these men, however,

FIG. 3. The "Grand-dad" of all American Milling Machines—Eli Whitney's original miller of 1818.



were abstract thinkers who lacked power to materialize their dreams. Those few who did have the energy and the courage to take action along such lines very promptly were put out of business—by autocratic governments, in case they attempted political or ideological reforms, or, in the cases of several early advocates of labor-aiding machinery, by stupid opposition on the part of workmen who looked upon machines as hated rivals to be destroyed, and which they did destroy.

First Interchangeability Program

Thomas Jefferson brought back from Europe not only some startling political ideas, but also the seeds of the interchangeable system of manufacturing. In 1785, while serving as United States Minister to France, he became keenly interested in the efforts of a French gunsmith named Le Blanc to manufacture muskets interchangeably. Le Blanc's system, to quote a letter written by Jefferson to John Jay at that time, "—consists in the making of every part of them (the muskets) so exactly alike, that what belongs to one, may be used for every other musket in the magazine."

A few years later, Jefferson wrote to James Monroe regarding that same man, Le Blanc: "I endeavored to get the U.S. to bring him over, which he was ready for on moderate terms. I failed and I do not know what became of him."

Fortunately, when Thomas Jefferson got hold of a good idea—whether political, economic or industrial—he was not one to drop it just because he encountered opposition or bureaucratic indifference. Following his return to the United States, he became acquainted with the young and brilliant inventor, Eli Whitney. Whitney became what well can be described as a protege of Jefferson.

In 1798 Eli Whitney—already a public figure because of his cotton gin invention—was awarded a contract by the United States Government for the manufacture of 10,000 muskets "on a new principle." What he aimed to do, so he explained, was "—to make the same parts of different guns, as the locks for example, as much alike as each other as the successive impressions of a copperplate engraving." That Whitney had everything that Le Blanc had—and more—is indicated by the following passage from a letter which his patron, Thomas Jefferson—by that time President of the United States—wrote to James Monroe in 1801. "He (Whitney) has invented molds and machines for making all the pieces of his locks so exactly equal, that take 100 locks to pieces and mingle their parts and the 100 locks may be put together by taking the pieces which come to hand."

Before the energetic and resourceful Whitney could turn out these interchangeable muskets in quantity, it was necessary for him to build an armory—which he located on a waterpower site at Whitneyville in the outskirts of New Haven, Connecticut. More important, and infinitely more difficult than that, he had to design and build every one of the new types of jigs, fixtures, tools, gages and *machine tools* upon which the success of his scheme depended.

Eli Whitney

Aside from what little, if any, he may have learned from Jefferson of Le Blanc's methods and machinery, Eli Whitney had no precedents to follow. He had to create everything "out of thin air," so to speak.

Naturally, all this took time. In fact, it took several years. During that critical period, the United States Government, at the continued urging of Thomas Jefferson, advanced what then were large sums of money. This was done despite the fact that no deliveries of guns were being made. It was done in the face of the still more disconcerting circumstance that Eli Whitney's theories in the meantime were targets of ridicule on the part of outstanding British and French ordnance authorities.

Whitney Fathered Tool Engineering

Throughout those critical years, which co-incided with Thomas Jefferson's two terms as President of the United States (1801-1809), the author of the Declaration of Independence continued to back his protege, Whitney, to the limit. In that respect this "Founding Father" demonstrated a degree of faith in Yankee ingenuity and in private enterprise which some people today might do well to emulate.

President Jefferson's faith in Whitney himself, in Whitney's new system of manufacturing, in his novel machine tools, and in his remarkable tool engineering achievements, all proved to be amply justified. The United States Government received its muskets, and at the price which had been agreed upon. The quality of those Whitney muskets was so outstanding that further and bigger contracts immediately were placed with this Yankee protege of Virginia's Thomas Jefferson. Thus it was that Eli Whitney established the technique and the profession of tool engineering as now practiced in America and throughout the world.

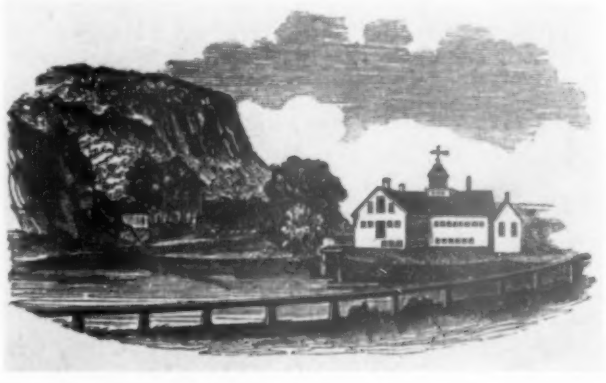


FIG. 4. Contemporary wood cut of the Eli Whitney Armory near New Haven, Conn., as it appeared when originally built about 1800. This is the birthplace of American interchangeable manufacture, and of *Tool Engineering* as it is practiced throughout the world today.

Apprentices Spread "Whitney System"

Through the medium of apprentices who eventually set forth as journeymen machinists after graduation from the Whitney armory, Eli Whitney's new manufacturing methods and his novel equipment by which his methods were accomplished quickly became known to many other enterprising American manufacturers. The result was that numerous other Yankee mechanics soon were busily engaged in enlarging the scope of the Whitney system and in designing and building the ever widening variety of machine tools to meet the rapidly growing needs of industry under the American system of manufacturing, as Whitney's system came to be called.

That job of machine and tool building never has been completed, and, as far as I can see, it never will be com-

ied as long as what we know as the "American Way of ife" endures.

Today—almost 150 years after the interchangeable system manufacturing was launched—direct successors to those d time Yankee mechanics who took their cues from Whitey, are building the world's finest machine tools in more lan 200 highly specialized plants located for the most part n New England; New York, New Jersey and Pennsylvania; Ohio and Indiana; Michigan; Wisconsin and Minnesota; Illiois and Missouri; and in California.

In view of the ridicule directed at Eli Whitney's methods by European ordnance experts, and in view also of the fact hat certain basic machine tools actually had attained a fair tate of perfection in France and in England prior to their ndependent development here in America, here is a bit of history worth remembering.

Striking Tribute from British

In 1853 a Royal commission was appointed to reorganize the Small Arms Manufactory at Enfield, England. The moving spirit of this commission was James Nasmyth, one of Great Britain's outstanding machine tool, forging and ordnance experts. After careful consideration, and following visitations on the part of a delegation from this Royal commission to the Springfield Armory and leading industrial plants here in the United States, it was decided that the American system should be introduced into the Royal Armory at Enfield—this being along the lines of James Nasmyth's earlier recommendations.

Thereupon the British Government placed orders with American machine and tool makers for practically all the equipment required to manufacture Enfield rifles under the system perfected by Eli Whitney 50 years prior to that time. Several hundred machine tools, together with a full compliment of jigs, fixtures, and gages, were covered in these British orders.

That was merely the beginning. Within the next few years, practically every government in Europe became involved in a mad scramble to install the American sytsem of arms production and to obtain the necessary American machine tools and accessories. That rush is still on, and what a mad rush it has turned out to be since the middle 1930's!

While the natural conclusion to be drawn from these remarks is that the machine tool and tool engineering industries here in America were born of the art of war, don't lose sight of the fact that, as far as we here in America are concerned, they were fathered by defense and not by aggression. Bear in mind also that the remarkable development and growth of machine tool building and tool engineering here in America always have been predominantly under the influence of the arts of peace, aside from the brief interludes of 1812-15; 1846-47; 1861-65; 1898; 1917-1918; and the not so brief interlude of 1941 until our tools finish the job in Europe and in the Pacific.

Tools of Peace Converted to War

Powerful interests in the Old World have persisted in considering machine tools primarily as instruments for providing more and better arms for larger and more powerful armies and navies. In America, however—except during those periods of national emergency just mentioned—most of our capable and influential machine tool, tool engineering and production brains and facilities have been devoted to the manufacture, tooling and use of machine tools as instruments for making available "more and better things for more people."

In so doing, there automatically have been created in our country more and better jobs for more people, thereby building up the market for the more and better things. In doing all this, America also did something else with which the aggressor nations failed to reckon. America built up the greatest potential for modern war material production that this world of ours has ever known.

Probably none were more surprised than were the rulers of the aggressor nations, when Uncle Sam—slow to anger like the proverbial patient man, but terrible in his wrath when goaded into action—ripped the covers off his quickly converted industrial facilities and revealed the United States as "The Arsenal of Democracy."

Foundrymen Vote 1945 Awards

Two gold medals and five honorary life memberships in the American Foundrymen's Association have been awarded by the association's Board of Awards for "distinctive contributions in the field of cast metals" for 1945.

Robert E. Kennedy, secretary of the association since 1938 and identified with it since 1921, received the Joseph S. Seaman Gold Medal, and C. E. Sims, supervising metallurgist, Battelle Memorial Institute, Columbus, Ohio, the John A. Penton Gold Medal.

Honorary life memberships were awarded to the two medalists and to Ralph J. Teetor, president, Cadillac Malleable Iron Co., Cadillac, Mich., M. J. Gregory, former factory manager of the foundry division, Caterpillar Tractor Co., Peoria, Ill., now retired, and to Rear Admiral A. H. Van Keuren, U.S.N., who directs the Research Laboratory at Anacostia.

Forge Die Makers Join NTDMA

As announced by Geo. S. Eaton, executive secretary of the National Tool and Die Manufacturers Assn., Cleveland, a group of leading drop forging die manufacturers convened in Detroit recently and voted to affiliate with the NTDMA. John S. Tincu, of Tincu Forging Die & Tool Co., Chicago, arranged the Detroit meeting and was elected chairman. He also represented the group at the Directors meeting held in Philadelphia in March.

A Forge Die Section of the NTDMA is planned to deal with any special activities which these manufacturers want handled. However, their problems and interests will mainly be identical with those of the other contract shops producing special tooling equipment—for example, in such matters as government regulations and controls, public relations, selective service deferments, excess profits taxes, and repricing, among others.

THE *Fundamentals* OF TOOL ENGINEERING

The Rotary Swaging of Metals

No. 3 of a Series

THE ART of swaging is old, even antedating the skilled armory of the middle ages, and remained a manual process until the comparatively recent invention of the rotary swaging machine. The usual method of hand swaging is by means of dies, for various diameters, held in the hardy hole of an anvil. The mating die, which is provided with a handle, is held by the blacksmith who—unless it be exceptionally heavy—also holds the workpiece, gripped with tongs. A helper then strikes the free swage with a sledge, the smith meanwhile rotating the work, which is heated. While the method is slow, a skilled smith can turn out excellent work by hand swaging.

Much Faster Than Hand Swaging

Note, in the preceding paragraph, that the workpiece is rotated. This is to prevent the forming of flash fins. In machine swaging, the process is reversed, in that the work is held stationary while the dies revolve around it. Furthermore, machine swaging is incredibly fast compared to manual. For example, a 10 roller machine, running 200 RPM, will strike 2000 blows per minute as against about 100 with several helpers striking in rotation. On small work, number of blows per minute, with rotary swaging, may exceed 5000.

A modern, rotary swaging machine is shown in Fig. 1 with the essential elements illustrated in Fig. 2. In the front elevation, of the latter, the cover plate is removed to show the dies, hammer blocks and rollers. The dies and hammer

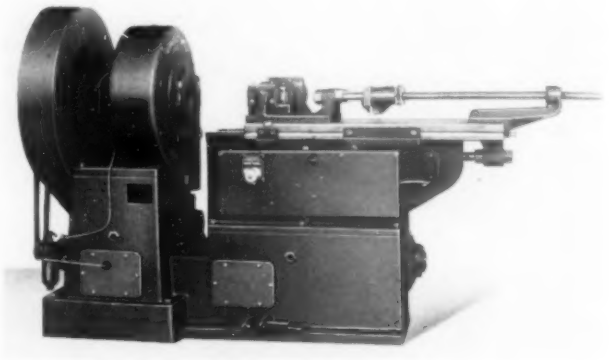


FIG. 1. Modern rotary swaging machine, with hydraulic feed and automatic, hydraulically operated vise. (Photo by courtesy of Langelier Mfg. Co., Providence, R.I.)

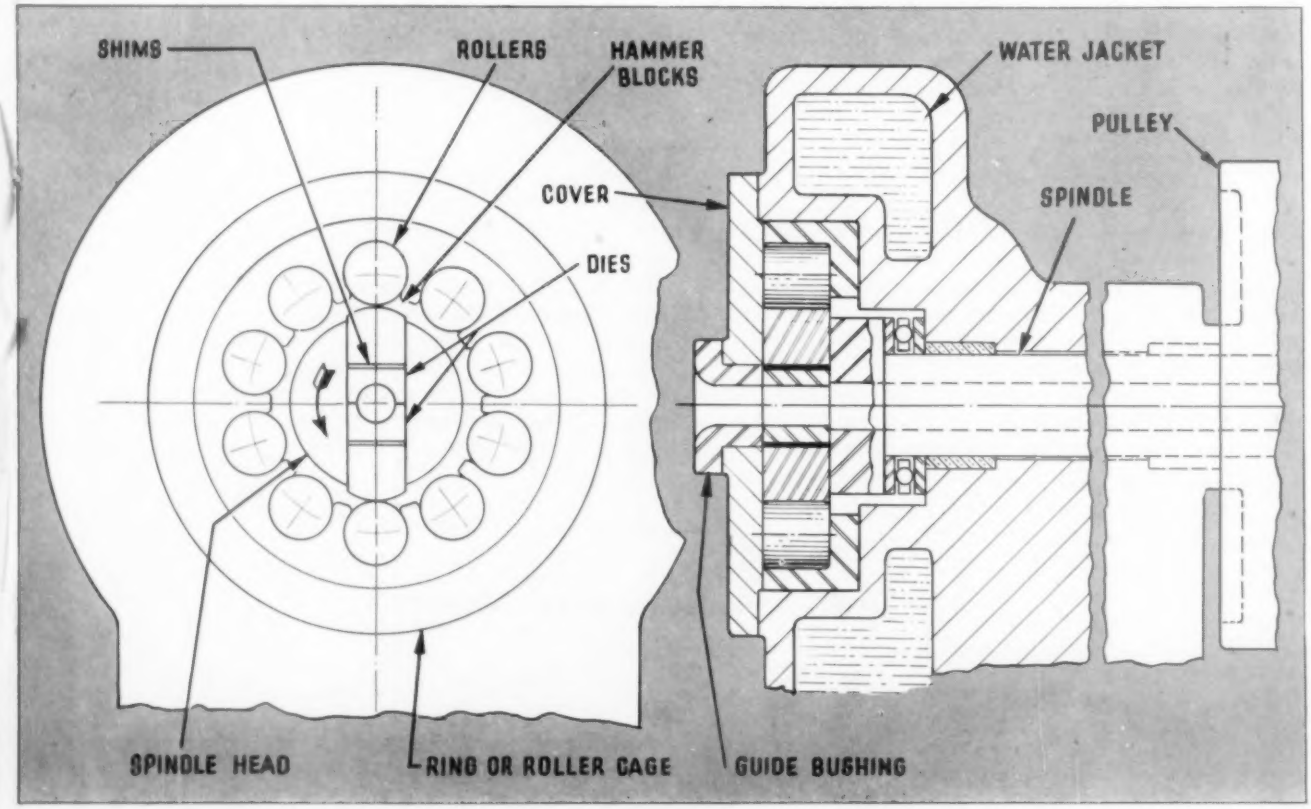


FIG. 2. Details of rotary swaging machine. At left, head-on view, cover plate removed, dies closed by rollers. At right, cross section through spindle, with cover plate in place.

blo[illegible] are held in a slot in the spindle head, slip fit, and rev[illegible] with the rotation of the spindle. They open as a re[illegible] of centrifugal force, then, as the hammer blocks strike the [illegible]llers, the dies are brought forcibly together. The rollers, wh[illegible] are hardened and ground, are contained in a hardened rin[illegible] cage, the fit being such that the rollers "creep" with eac[illegible] successive blow, to distribute wear.

[illegible]etails of assembly are shown in the sectional view, in wh[illegible] the cover plate, with guide bushing, is shown in place. No[illegible] that the spindle is hollow, the I.D. being somewhat lar[illegible] than the largest work for which the machine is designed. Also note the water jacketing, usually incorporated in the larger machines. The spindle is heat treated and hardened, with diameters and slot ground. However, it may be left soft, when a hardened and ground wear shoe may be incorporated, as shown in Fig. 3.

Reducing Tubing

In Fig. 4, is shown a set-up for reducing tubing, either straight or bottle necked. The tube is gripped in a chuck or holder, and may be fed into the dies manually (in the case of light work) or by means of rack and pinion or, preferably, by means of a hydraulic cylinder. The work is centered by means of the guide bushing, and the minor I.D. controlled by the mandrel. If, on the other hand, it is desired to control the entire I.D.—i.e., both major and minor diameters—then the mandrel could be incorporated in the feed ram, as suggested by the dot and dash lines.

In swaging bullet nosed shapes, as shown in Fig. 5, one proceeds largely as above. In this case, however, the metal has no chance to "flow"; instead, it tends to thicken, at the nose, as it is displaced by the successive blows of the dies. This thickening may be advantageous, especially when swaging return bend tubes such as are used in steam boilers.

Rotary swaging is not only extremely fast, but covers a very wide range of work. For example, pins—as those used for jewelry—may be pointed as fast as an operator can insert them, with the added advantage that gold plating on the wire is thickened, near the point, and made harder, thereby adding to resistance against wear. A basis for comparison, a tube .3" in diameter (as in Fig. 5) may be closed in a few seconds.

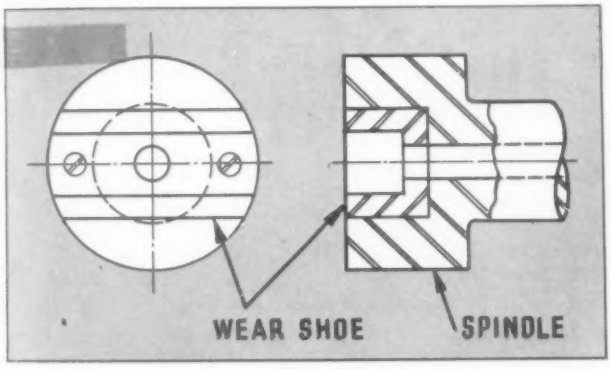


FIG. 3. Section through spindle. Spindle heat treated or soft, but provided with a hardened and ground wear shoe or die guide.

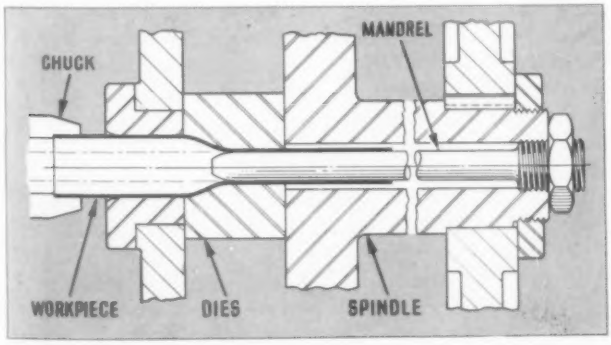


FIG. 4. Section through spindle, showing reduction of tube and bottle shape. Note mandrel for controlling I.D.

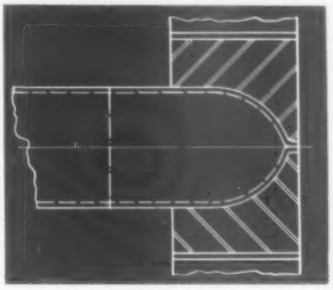


FIG. 5. Section through dies for closing end of tubing to bullet nose.

Swaging can be used to increase the ductility of metals, as well as to shape them. Inversely, it can harden them as a result of the peening action of the dies.

In connection with swaging, we should include mention of the hammering machine, which operates on the same principle, only in reverse in that the work, not the dies, rotates. As in swaging, however, the dies are symmetrical, but, the lower is held in a shoe—as in press installations—while its mate is held in the hammer block, which vibrates rapidly.

One use, for hammering machines, is—or was—in the making of round head gold or filled collar buttons. Among others, may be included the manufacture of small, hollow balls, such as are used for ball-link pull chains or even for some very light duty ball bearings. Making of such balls is shown in Fig. 6, with a cross section of the die in Fig. 7.

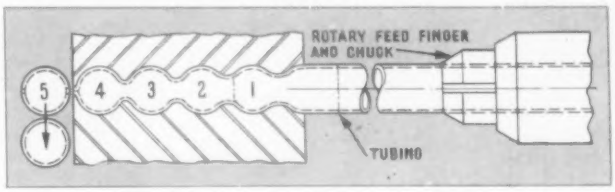


FIG. 6. Section through dies of hammering machine, showing successive reductions of tubing in the manufacture of hollow balls.

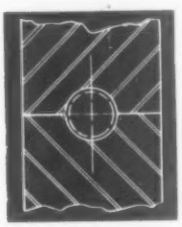


FIG. 7. Cross section of die used in Fig. 6.

Here, the tubing is gripped in feed fingers, somewhat after the manner of gripping bar stock in a screw machine. The fingers are incorporated in a rotating spindle, but with a slip joint, for forward feed, and provided with stops. In operation, the tube is fed into the first form in the die, which slightly necks it, then progressively through the several forms until it finally drops off as a ball.

The illustration shows 5 stages, with Nos. 1, 2 and 3 being preliminary breakdowns. In No. 4, the ball is rounded, dropping off as it leaves the dies at No. 5. It may, however, be necessary to roll the ball as a later operation, to remove any slight projections. This is done in a ball rolling machine, essentially consisting of two discs turning on eccentrically opposed spindles. But as for the original forming (Fig. 6), once the tube has passed through the preliminary breakdowns, the balls are formed in the time of any one breakdown.

This is the third of a series on metal processing in which the material is shaped or reduced without cutting. Following in orderly sequence, we next take up "The Elements of Wire Drawing," to be discussed in the July issue of The TOOL ENGINEER.

Photo by courtesy of Carboloy Company.

Carbide Cutters—Their Application

By Anders Jansson

Despite that sintered carbides have largely revolutionized metal processing—certainly, have accelerated cutting speeds far beyond previous concepts— and, as a consequence, have been highly publicized, there is still considerable to learn regarding their properties and application. This holds especially when, in starting a new job, it becomes a question of selecting the proper grade, not only from one of many of a particular make, but, if the first choice it not available, from the alternate grades of the several manufacturers of carbide tools.

Factors in Selecting Grades

Many factors govern selection, as the nature of the material to be processed; whether it is to be milled, turned or bored; whether cut is heavy or light, continuous or interrupted, and whether feed is coarse or fine. Steel, for instance, requires a different grade than cast or malleable iron, or non-ferrous materials, and may in turn entail discriminating selection if the metal is cast or mill processed, if hard overall or in sections, or if it be tough or abrasive.

While carbides suited to steel may be used to process cast iron or malleable, and even non-ferrous materials including plastics and fiber, it would be entirely fallacious to assume optimum performance with grades unsuited to the job. For, while some firms are said to prefer steel cutting grades for these materials (perhaps to reduce inventory), it is generally conceded that straight tungsten carbides are best suited to materials that do not show steel characteristics.

Iron, whether cast, malleable or mill processed, as wrought iron, and the mild steels—as 1010 and 1020—requires carbides having greater resistance to abrasion and cratering than the grades commonly used for high carbon or high tensile alloy steels. This also holds for the non-ferrous materials, the most of which call for grades having considerable resistance to abrasion as well as ability to hold a keen edge.

However, the desirable qualities of carbide tools—as edge strength and ability to retain keenness, toughness and resistance to wear, abrasion and cratering—have been so publicized, by now, that they should be obvious to anyone having average knowledge of machining operations. They are taken for granted, hence, any detailed elaboration would seem to be superfluous.

With regard to cratering, this results from practically all of the materials, especially on turning jobs, although it may be considerably lessened by resort to chip breakers. Because of cratering, however, users not overly familiar with carbides

may be tempted to specify the harder grades which, in turn, are less resistant to shock. But then, resistance to shock is only comparative in any of the carbide grades, and may be enhanced or lowered, as the case may be, by application or misapplication.

Actually, the hardness of a carbide is a poor guide to its utility—certainly it should not be considered a criterion of quality. In many instances, a grade (and even a make) has been condemned because of failure when, as a matter of fact, it may have been admirably suited to the job. Properly applied, carbide tools will perform amazingly, will even stand a considerable amount of abuse; misapplied, they may chap, flake or fracture as though made of pipe clay. But, that would not be the fault of the tool.

No Vibration or Chatter

One of the "musts," in the use of carbide tools, is freedom from vibration and chatter. True, there is always some latent vibration when cutting metals, whether one is turning, boring or milling. Play in spindles, backlash in transmission gears, and loose machine slides all tend to induce chatter, as does spring in tools due to excessive overhang or lack of support under the tools. In the case of workpieces, inadequate chucking and thin wall sections, not properly dampened, may result in a "sing" (high frequency vibration) in nowise conducive to tool life. Any one of these conditions may be damaging; in combination, they are ruinous to any carbide tool.

While the importance of rigidity, in machines, tool holders, fixtures and even the tools themselves, has been stressed repeatedly, not only by the makers of carbide tools but by the technical press, a few examples of "wrong" and "right" may not be amiss here. These examples are not theoretical, but are taken from actual practice—from working conditions. And, while they may seem elementary and obvious to the experienced, these "dos" and "dont's" are still being hammered home by the experts.

and Selection . . .

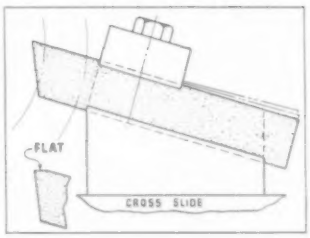


Fig. 1. Wrong application of cut-off tool. Uptilted tool hooks into work, while inadequate support and clamping induces up and down weave during cut, resulting in tool breakage. Flatting the tool eliminated hooking, but did not correct other conditions.

Fig. 1 shows a wrong application of a popular cut-off tool—a Tantung, made by Vascoloy-Ramet. The tool was set at an angle so that it hooked itself into the work, resulting in recurrent breakage. To correct this condition, the top was flatted off, at the cutting edge, but this only proved a palliative since there was no support under the tool. Also, inadequate clamping caused the tool to lift, at the heel, from the leverage of the cut. The tool still broke, but not so often; however, nothing was gained since the feed had to be reduced below a rate where its use was economical.

Fig. 2 shows a tool holder which provided more favorable conditions, especially rigid clamping and, if not 100 per cent support under the tool, at least as much as clearances would

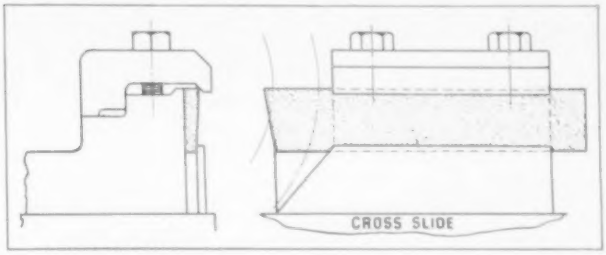


Fig. 2. Tool properly supported under cut and rigidly clamped. Tool centered, during cut, but concave grinding as shown at A, Fig. 3.

permit. The tool stood up under feeds beyond even those recommended by the maker. In the trial runs, however, it was found that the tools would break from side weave, largely occasioned by the heavy cut and the fact that the tool was ground at an angle to provide for a clean cut-off. This was corrected by grinding a slight concave in the cutting edge, which effected the same result but tended to center the tool throughout the depth of the cut. (See Fig. 3, showing several methods of grinding.)* It also broke the chips, prolonging tool life.

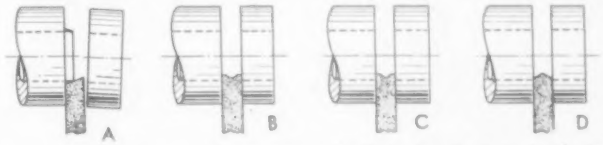


Fig. 3. Various ways of grinding cut-off tools. Tool A tends to spring to right, while tools B, C and D will center, also, tend to break chips.
A. Conventional angle grind
B. Concave grind centers tool & breaks chips.
C—D. Inside and outside two-angle grinds. C difficult to grind; both inferior to B.

What holds true for the cut-off tool described also holds for any of the stock carbide lathe tools, of which the six popular, standard types are shown in Fig. 4. These come in various sizes, and are interchangeable, make for make; also, grades are so closely comparable, on the whole, that one can usually obtain an alternate if the original make is not immediately available. They are furnished right or left hand.

As used on the job, these tools should be as heavy as tool holders will permit—in fact, it is sheer economy to make special holders, rather than risk below-par performance with light tools. Of course, size would depend on the depth of cut and rate of feed; however, it is better to lean toward solidity, even to the extent of providing support under the tool to the limit of clearance. The little extra investment will pay good dividends.

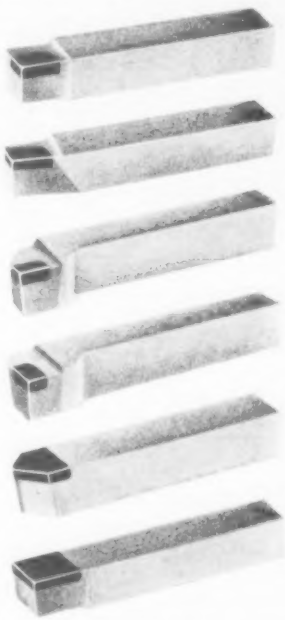


Fig. 4. The "Big Six" in carbide lathe tools.

*One manufacturer, of cut-off tools, is supplying stock tools ground with a concave; however, the writer is not aware that carbide cut-off tools are being so ground commercially.

All of the makers of carbide lathe tools furnish carbide-tipped tool bits in sizes comparable to and interchangeable with conventional high speed steel bits. However, these may not be successfully used with tool holders designed for high speed steel bits (Fig. 5-A) in which the tool slot is up-tilted besides which they usually lack the necessary support under the tool. Instead, one uses tool holders especially designed for carbide-tipped tools, as the Armstrong holder shown in Fig. 5-B. The comparison is so obvious that further elaborations seems unnecessary. However, the reader will note the "flat" cutting angle of holder B and the close-up support of the cutting edge.

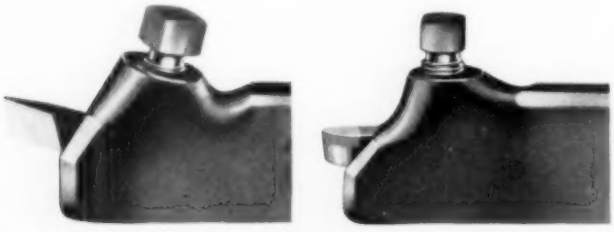


Fig. 5. Tool holder at left designed for high speed steel bits; not suited to carbide tools. Holder at right (B) is especially designed for carbide bits. Armstrong tool holders shown.

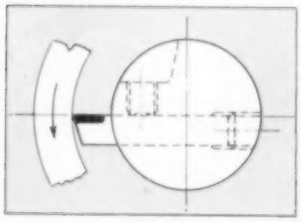


Fig. 6. Tool bit inadequately supported, causing spring with resultant chatter. Tool will break.

What holds for lathe tool holders also applies to boring bars. One cannot expect optimum performance when tools overhang the bar without adequate support, as shown at Fig. 6. Rather, boring bars should be provided with ample support, not only under the tool, but in back of it, as shown in Fig. 7. In this connection, "pre-broached" holes are now available, as shown (installed) in Fig. 8. These are made by Sturdy Broach Company, Detroit, and may be pre-shaped for tool support prior to installation in the bar.

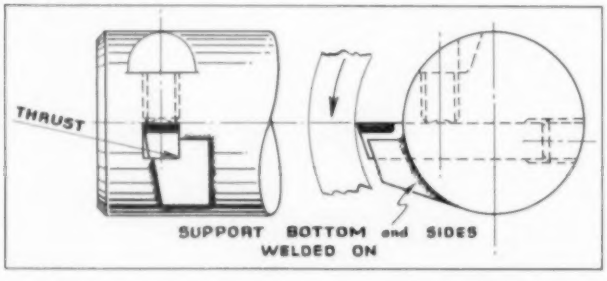


Fig. 7. Carbide-tipped tools used on boring bars should have side backing as well as support underneath. Provide ample chip clearance.

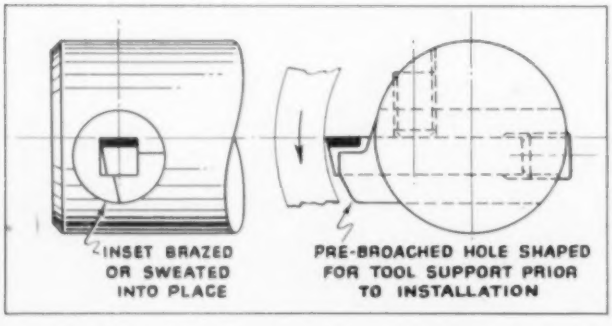


Fig. 8. Commercial "pre-broached" holes as applied to boring bars.

Of late, shear cuts and negative rake have come in for considerable publicity, and while these deviations from conventional are by no means cure-alls, they often spell the difference between failure and success on many jobs employing carbide tools. And this applies to all phases of metal cutting and especially to interrupted cuts, as in Figs. 9 and 10. Incidentally, these illustrations are suggestive of conditions rather than of actual jobs; nevertheless, they have their basis in fact.

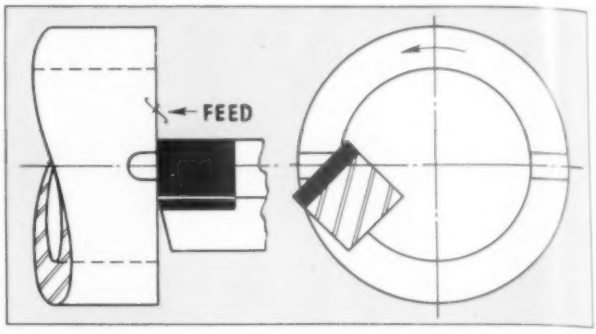


Fig. 9. Facing operation. Tool set at shear angle to bridge interrupted cut. Cross-slide locked, tool in-fed.

Fig. 9 shows a facing operation, employing a square end tool set at such an angle that it bridges and overlaps the interruption. Thereby, there is no "jump" or shock, rather, the tool is in continuous engagement during the entire facing operation. The same tool could be used to face the capped work-piece shown in Fig. 10, where the interruption is occasioned by the shim between the casting and the bearing cap.

There, however, the interruption is narrower, permitting use of a cross fed tool having 40 degrees shear, as in Fig. 11. Incidentally, these "shear-cut" tools are now available from stock. In either case, the ends could be finished with a piloted

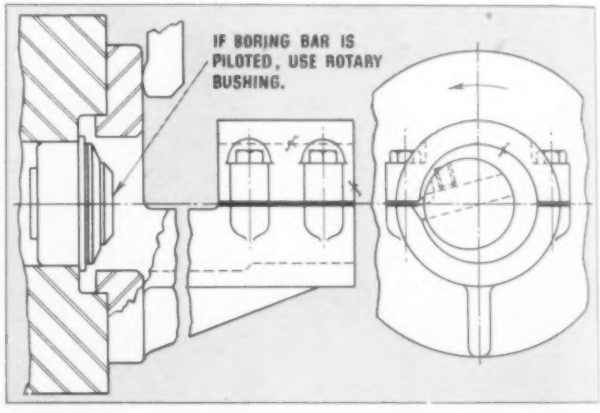


Fig. 10. Boring tool, with negative rake, bridging interrupted cut. End can be faced with tool as shown in Fig. 9, or, as shown in Fig. 11.

facing cutter, (as suggested in Fig. 10) the blades of which could be sheared up to 45 degrees. Such shearing also works nicely even if there be no interruptions, the shear tending to effect a smoother cut.

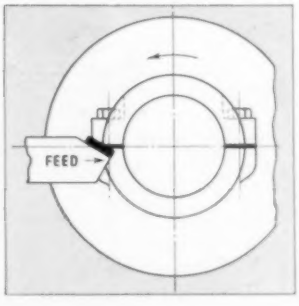


Fig. 11. Same part as Fig. 10, but faced with shear-angle tool. Cross feed.

Essentially, Fig. 10 shows method of boring and interrupted cut with a tool bit having a 15° back rake and set over center so that total negative is 30°. The tool would also have a side cutting angle of about 15° and a side rake of at least

the combination tending to bridge the comparatively narrow interruption. Where the interruption is too wide to bridge due to shallow depth of cut, shock can be considerably reduced, if not entirely eliminated, by use of two tool bits plus or minus 180° apart. The one will be in the cut when the other jumps the gap. Note the rotary pilot bushings, suggested for use with piloted bar.

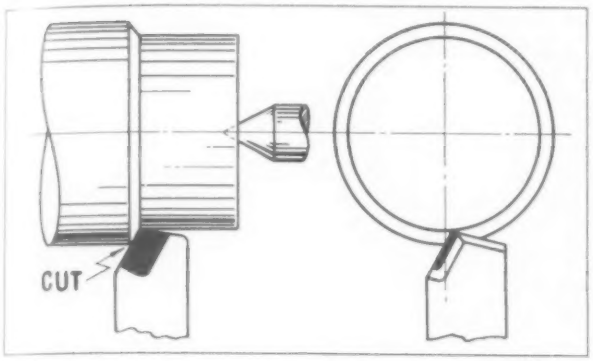


Fig. 12. **Negative rake tool takes brunt of cut nearer toward heel of bit, saving point.**

Fig. 12 shows one of the advantages of negative rake, in that the brunt of the cut is taken toward the heel of the carbide bit, not at the point. Here, the side cutting angle is about 20° (some prefer 15°) 10° average back rake and 15° positive side rake. That these angles and rakes be clearly understood, they are defined in Fig. 13 where A=side cutting angle, B=back rake and C=side rake. These rakes and angles may be varied; for the tool shown, however, it may be desirable to grind a flat land, as shown. This land should be equal to the feed.

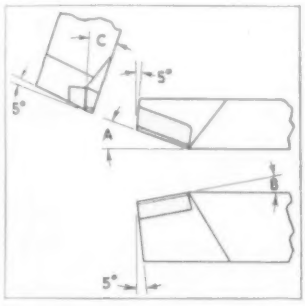


Fig. 13. **Negatives rake lathe tool for straight turning. Side cutting angle and back rake negative; side rake positive. A=Side cutting angle, B=Back rake, C=side rake.**

So far, we have mainly concerned ourselves with turning operations, and largely, those applications are pertinent to milling. That is, there must be rigidity in the clamping of the work and, as far as possible, reduction of vibration, chatter and shock of the cutters. The latter consideration is of grave moment in hyper-milling, where widely spaced teeth or fly cutters are subject to considerable shock due to the intermittent cutting action.

An excellent way to reduce this shock is by use of flywheel arbors, such, for instance, as are commercially manufactured by Weddell Tools, Inc. (See Fig. 14). While these are part of the cutter set-up, so as to hold the cutter as close to the flywheel as possible, one may install flywheels on the arbor. In either case, the flywheel imparts momentum, carrying the tooth or teeth through the cut with a considerable reduction, if not entire elimination of vibration.

The main reason for fly cutters—or cutters with widely spaced teeth—is that, in milling with carbide cutters, performance is best effected with coarse toothed cutters. For example, the recommended feed per tooth is from .008" to .012", with surface speeds anywhere from 350 to 750 SFPM, for steel. Assume a 4" diameter cutter, at .008" feed per tooth, this would imply about 340 R.P.M. at the slower speed, with feed at 2.75" per minute per tooth. Thus, a 6-tooth cutter would give a feed of 16.32" per minute.

With a coarse tooth cutter, there is ample room for chip curl, also for disposal, either from the centrifugal force engendered by the high speed, or from the wash of the coolant. If, however, the teeth are closely spaced, as in conventional cutters, one would have to effect a considerable reduction in feed to prevent loading. And this, in turn, would lower the efficiency of the cutter, since carbides work best at the recommended speeds and feeds. There is, however, a happy medium that, in many instances, must be arrived at by actual conditions of the job being processed and the machine used. Too high a speed results in excessive wear of carbide; inversely, speeds that are too low also reduce cutter life.

Negative Rakes in Milling

Negative rakes have also come into considerable prominence in milling, especially with the introduction of Hyper-Milling, as pioneered by Firth-Sterling Steel Company. Here, carbide-tipped inserted blades are installed in the body of the cutter with negative rake and negative helix angle, the combination permitting speeds not previously practical with conventional cutters. The dual negative angles are especially applicable to the milling of steel and the tougher cast iron alloys, and here, the recommended angles are 10°, respectively, for rake and helix angles.

For in-fed facing, however (as in Figs. 9 and 10) the blades may be "sheared" at angles up to 45°, the blades being set ahead of center so that the chips clear toward the periphery, much as flour is forced to the outer edges of the millstones, in milling. Here, however, the nature of the material to be cut will determine helix angle; it may be neutral—i.e., parallel with the axis—for brass or cuprous metals—or negative or even slightly positive for steel. There is this advantage with shear-cut, among others, that the cutting edges are not so quickly dulled or chipped from hard spots or surface scale.

Fig. 14. **Flywheels, used with hyper results, impart momentum and reduce vibration and "jump." They improve finish and increase life. Weddell Flywheel cutter shown.**

However, it is not proposed, here, to go into detail with regard to speeds and feeds in milling, partly because the picture is constantly changing due to new developments, but mainly because these phases of metal processing have been quite thoroughly covered by the several manufacturers of carbide tools. And without exception, their recommendations may be accepted as gospel—if anything, they lean to the conservative side.

Firth-Sterling's bulletin—"Hyper-Milling," and Carboloy Company's Bulletin GT-174—"Milling Steel with Carbides"—will acquaint the interested with the basic techniques of negative rake milling and the general design of cutters. In this connection, a paper by Fred C. Lucht, development engineer for Carboloy Company, gives valuable information on "Selecting Carbides for Milling." It is available, on request, from Carboloy Company.

Kennametal, Inc., has also contributed notably to the sum total of knowledge on hyper-milling—in fact, has established that milling cutters with negative helix angles up to 35°, with a hook angle of 15°, may be successfully employed in face milling such hard, tough materials as armor plate and gun breech blocks. Notable contributions have also been made by Vascoloy-Ramet—in fact, research and development by all of the "Big Four" in carbides have combined to put the sintered carbides in an unique place in the mass production field.

Proper application of carbide tools, however, is not enough in itself. Grinding is also of paramount importance—in fact, a carbide tool imporperly ground may be entirely ruined before it takes a cut, or, life may be shortened to a point where its use is hardly economical. Where stock lathe tools may be quickly (?) replaced, inserting new blades into a cutter body, together with the necessary grinding and incidental tool room expense, is another matter entirely. Besides, there is lost machine time in exchanging cutters (assuming one has a replacement) and in the necessary resetting and adjustments. And idle machines are a liability.

Inversely, proper grinding and finishing can add considerably to tool life. And here, the first requisite for proper grinding is the selection and use of the right wheel. In this connection, Kennametal, Inc. gives the following recommendations for free hand grinding.

Roughing	*Finishing*
Straight wheel, Norton 3460 K+ 7	Norton 34100 J+ 7
Cup wheel, " 3460 K +7	" 34100 I+7
Respectively, for Car- 60P-WEG	Carb'm 120P-WEG
borundum 60RW-GG	" 100R-WGG
100 grit diamond wheels.	220 grit diamond wheels.

Honing Increases Tool Life

For rigid machine grinding, Kennametal recommends nothing except diamond impregnated wheels for machine grinding of their own tools, and this recommendation may safely be followed for the machine grinding of all carbides. One DON'T stressed by Kennametal:—never grind steel cutting grades on a rigid fixture, or on a magnetic chuck with silicon carbide wheels.

In addition to grinding, honing or lapping (with diamond impregnated laps) adds materially to tool life. Even the most careful finish grinding will leave tiny serrations that loom rather large under magnification, and these tend to start breakdowns of the cutting edge. Therefore, honing pays. As a matter of fact, there are authentic instances where tool life has been increased up to 400 per cent because of honing.

We now come to the selection of grades—and here there is considerable diversity of opinion, partly among field service engineers, partly among the users. As previously stated, some incline to the straight tungsten carbides regardless of material to be cut, while others are more flexible in their choice. Sometimes there is no choice, as in the case of a manufacturer having to hot-trim welding flashes on welded assemblies. Only one grade, especially developed for flash trimming, stood up under the combination of heat, slag and the loading ahead of the cutter—and even that failed until negative rake, combined with shear angle, was resorted to. So, it's not altogether the grade, but the way it is applied.

Selecting the Grades

In general, it can be said that the qualities of carbide grades are relative—i.e., as between grades. All are hard, it's just that some are tougher. They are also relative between makes although, as a rule, one may safely purchase alternates, of any of the several makes, if the original is not immediately available. In any event, one may safely refer to the sales or service engineers of any of the carbide manufacturers, with the assurance that their recommendations will be honestly advanced and with the best interests of both the industry as a whole and the user in mind. This has been especially true during the emergency.

One reason for a leaning toward the straight tungsten carbides is that they are more wear resistant than what may be termed the alloys or "triple" carbides—i.e., the tungsten-titanium-tantalum carbides. The latter, however, are tougher, hence, will withstand a relatively greater amount of shock. The one may be applied to roughing cuts, whereas the straight tungsten may preferably be employed on finishing cuts where the edge is subjected to abrasion because of high speed, light cuts and fine feeds.

However, it is not the intention, here, to go into detailed recommendation of grades for the many materials that may be processed with carbide tools. One can be reasonably certain, however, of obtaining a grade suited to the job and that grade should be given a trial until proven unsuitable. In the final analysis, one may confine oneself to about seven standard grades, with "specials" still to be tried if the standards do not show satisfactory performance.

Selection Charts

Chart A, below, gives the comparative grades of the "Big Four" for the cutting of steel, while chart B, gives the selection for cast and malleable iron, and the prevailing non-ferrous metals and materials. Before purchasing in any quantity, however, it will be well to check with the maker, giving all necessary information regarding the job to be processed.

CHART A. GRADE SELECTION CHART OF CARBIDES FOR STEEL

TYPE OF WORK	TRADE NAME	TYPE OF CUT: STRAIGHT DEPTH	STRAIGHT DEPTH	INTERRUPTED
		⅛–¼	¼–1"	
Roughing Cuts	Firthite	TA	8–83	T-04
	Carboloy	78B	78B	78C
	Kennametal	KM	KM	K25
	Vascoloy-Ramet	EM	EE	XX
		.066–⅛	⅛–¼	
Finishing Cuts	Firthite	T-16	TA	T-A
	Carboloy	78	78B	78-B
	Kennametal	K3H	KM	KM
	Vascoloy-Ramet	X	EM	E
		.001–.010	.010–.060	
	Firthite	T-31	T-31	T-16
		MF	HA	HA*
	Carboloy	831	78	78
		905	883	833*
Lighter depths and finishing cuts.	Kennametal	K4H	K4H	K3H
	Vascoloy-Ramet	E	E	E
		2A5	2A5	2A5*

* Some firms prefer straight tungsten carbides for light finishing cuts on steel machining

CHART B. GRADE SELECTION CHART OF CARBIDES FOR CAST AND MALLEABLE IRON AND NON-FERROUS MATERIALS

MATERIALS	TYPE OF WORK	TRADE NAME	TYPE OF CUT: STRAIGHT DEPTH	STRAIGHT DEPTH	INTERRUPTED
			0–⅛	⅛–1"	
		Firthite	HA	H & MA	HC
			T-83	T-04	T-04*
Cast Iron Total Carbon 1.2 min.	Rough Castings	Carboloy	44A	44A	55A
		Kennametal	K6	K6	K25
		Vascoloy-Ramet	2A5	2A68	2A3
			0–⅛	⅛–⅜	
Malleable Irons with total carbon 2 min. Varies according to alloy.	Smother casts and general finishing.	Firthite	HA	HA	H
			MF	T-83	T-04*
		Carboloy	883	44A	44A
		Kennametal	K6	K6	K25
		Vascoloy-Ramet	2A5	2A68	2A68
			0–⅛	⅛–1"	
Aluminum Alloys	Rough & Finish including Milling	Firthite	MF	HA	HA
		Carboloy	907	883	883
		Kennametal	K4H	K3H	KH
		Vascoloy-Ramet	2A5	2A68	2A68
			0–1/16	1/16+	
Brass Bronze Zinc alloys Plastics Hd. Rubber & Non-metallics	All	Firthite	MF	HA	H & HD
		Carboloy	905	883	44A
		Kennametal	K6	K6	K6
		Vascoloy-Ramet	2A7	2A5	2A68

* Some firms prefer steel cutting grades for C. I. & Malleable but in general tungsten carbides are preferred except where material shows steel characteristics.

By F. W. Boeckel

Simplified Inspection of Thread Gages

A simple fixture, in combination with 3-wire method, provides easy checking of pitch diameters of pipe thread gages

IN LINE with high standards of quality demanded on war work, the once lowly pipe thread has definitely entered the precision class. And, the result is another headache for inspectors who, required to check purchased tools, often lack the proper equipment for special jobs. With regard to pipe threads, for instance, the optical comparator and the sine bar provide means to check pitch, thread and taper angle.

Pitch diameter, however, presents a problem that can be solved with a simple gadget, as described below. First, however, we will state the proposition, using a ½"—14 N.P.T. gage (Fig. 1) as an example. Referring to the illustration, it will be seen that E_0 represents the pitch diameter at the small end, E^1 pitch diameter at notch L^1 distance of gaging notch from the small end, and L_3 the effective thread length.

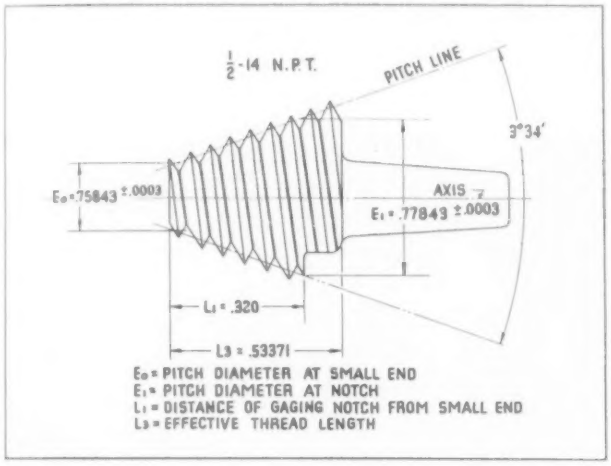
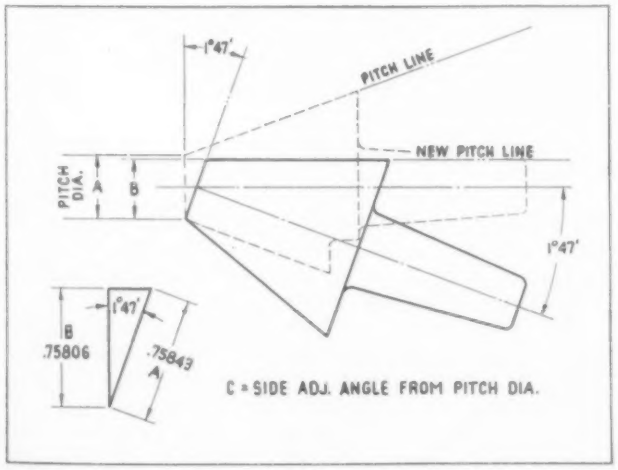


FIG. 1

Now, position this ½"-14 thread gage on a parallel plane. Then, drop the axial center line on a 1° 47' angle (the taper angle) with the parallel plane. By pivoting it from a point represented by the bisection of the bottom pitch line and the vertical face at L_1, a parallel pitch line is established. See Fig. 2.

FIG. 2 (BELOW)



Pitch dia. at E_0 is specified as .75843, which now becomes the hypothenuse of the 1°-47' angle. The side adjacent—C—to this angle becomes a theoretical pitch diameter and an accurate checking dimension for the entire length of the thread. Inaccuracies in the taper angle on the pitch line, which in many cases cause the real difficulties in qualifying a precision product, will now be indicated.

While the pitch diameter can be correct at either E_0 or E_1, the question now arises: How can an accurate measurement be taken on the pitch line at E_0 on a taper thread? We now refer to the fixture, Fig. 3, which on the whole is self explanatory. As shown, the pitch line angle is ground to 3°-34', and the ends to 1°-47'. At the rear, a spring plunger is used to hold the gage to be tested against the gaging face.

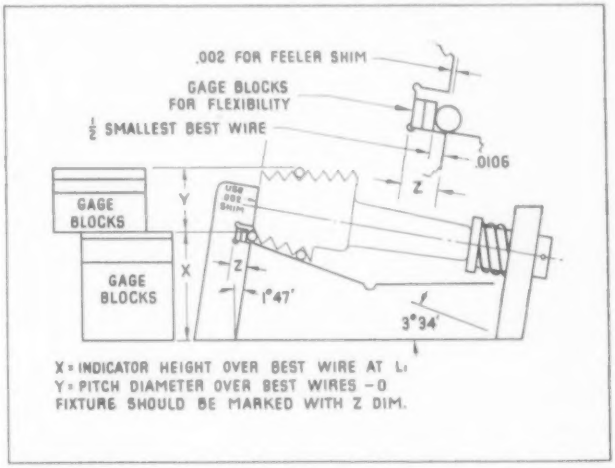


FIG. 3

Referring to the symbols, X represents indicator height over best checking wire at L^1, and Y, the pitch diameter over the best checking wires. The depth of notch—Z—should be marked on the fixture, so that predetermined size blocks may be used to locate the center of the best checking wire for each pitch, and at the proper point in relation to the face of the gage at L_1.

Setting Up for Inspection

The .002" shim may be used as a feeler. In setting up for inspection, the bottom wires are placed in their relative positions on the angular block and the gage thread on the rear wire. A slight pressure of the E_0 face against the forward wire, or a slight right or left rotation of the gage on the wire, against the shim, will properly locate the face of the gage.

A minor difficulty now presents itself—positioning the top wire securely for accurate indicating. However, a small pellet of molding clay, on either side of the apex of the outside diameter, will allow the imbedding of the wire on a level plane touching accurately on the pitch line. Checking may now be done with gage blocks (as shown) or with indicator or height gage, as the case may be.

This method provides accurate means of analyzing many perplexing problems associated with pipe thread inspection in even the best equipped plants. It is simple, reliable and, what is more to the point, always ready.

By Andrew E. Rylander

Tracer Controlled Milling

Modern profilers in both actual size and pantograph types assure speed and accuracy in duplicating irregular work

IT IS a far cry from earlier profile milling, with the "feel" between tracer finger and master form entirely dependent on the sensitiveness of a highly skilled craftsman, and the super-sensitive, precision duplicators of the present day. These modern machines, be they manually, electrically or hydro-electrically controlled, require no particular skill for their operation. This, however, should not be construed as a disparagement of skill, rather, the implication is that the machine, instead of the operator, controls quality.

Skilled Operators Not Required

On mass production runs, any operator endowed with reasonable mechanical "gumption" can duplicate practically any shape, with the machines described, to very close limits of tolerance. And on tool work, such as dies and intricate forms, the average mechanic or milling machine operator, working from a master, can turn out work that would ordinarily tax the skill of the most highly trained specialist. All this at savings in time and costs that, by and large, are not even remotely approached by other methods of profile milling.

A number of concerns are engaged in the manufacture of duplicators, or of duplicator attachments which may be adapted to standard milling machines. However, we are indebted to George Gorton Machine Company, Racine, Wisconsin, for the examples of *tracer controlled milling* described and illustrated in this article.

The machines shown are of two types:—manually operated, tracer controlled pantograph reducing machines, and identical size, tracer controlled duplicators. The latter, in turn, are either manually or electrically operated. For all practical purposes, these are conventional milling machines which, by addition of tracer heads and duplicator tables, in the smaller models, may be quickly converted to duplicators. Conversely, detaching these auxiliaries as quickly reconverts them to millers.

These machines are extremely flexible, with spindle speeds up to 12,000 RPM. in the smaller sizes, and up to about 2,800 in the larger. The larger sizes are of two types—knee type and bed type, and in addition to quick conversion for tracer controlled milling—and vice versa—any or all may be as quickly converted to precision jig boring. All models are vertical.

FIG. 1. An interesting application of automatic rotation profiling. Here, work and master rotate with table movement in milling 10 elliptical wells in a gun part. Manual control.

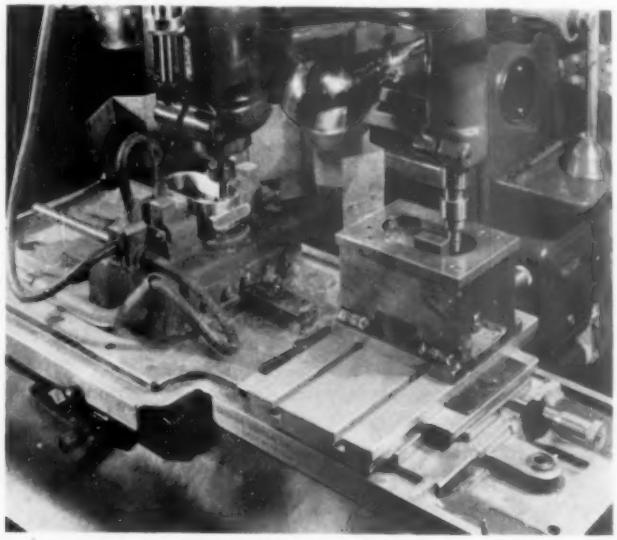


FIG. 2. Production profiling, manual control, on movie camera case. In this, as in all other illustrations of tracer controlled profiling, master and tracer finger is at right, work and cutter spindle at left.

Referring to the illustrations, Fig 1 shows an interesting application of automatic *rotation profiling*. Here, work and master (at right) rotate with the table movement in milling 10 elliptical wells, no two of which are alike, on a cylindrical interruptor cam for control of gunfire.

The blank cylinders come to the duplicator finish turned, and the wells are first rough milled to a depth of .052". Then, by merely lowering the spindle, a finish cut of .010" is made with the same cutter speed as for the roughing cut. The machine is a Gorton 9-J, using a tungsten carbide 2 flute cutter. The cylinders are $9\frac{9}{16}$" O.D. x $7\frac{25}{32}$", of S.A.E.

[illegible] seamless steel tubing, and the wells vary from ¾″ [illegible] x ⅜″ long to 3⅝″ wide x 2″ long, all .062″ deep, with tolerances plus or minus .005″. Spindle speed is 4,000, feed manual, and floor to floor time 43 minutes.

Another interesting example of tracer controlled produc-

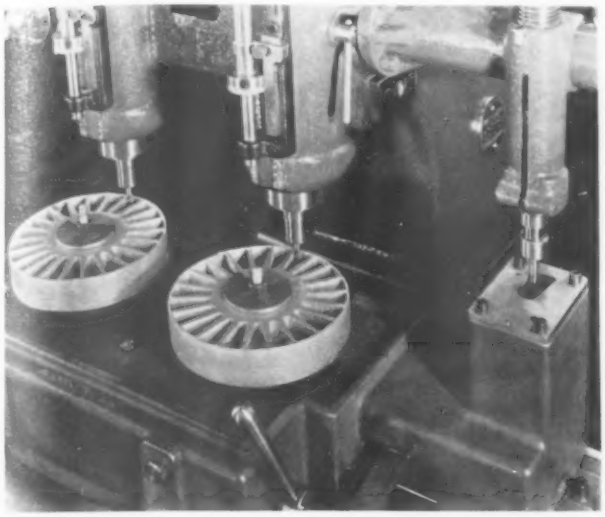


FIG. 3. 2 spindle production profiling from a single, simple master. Index fixture is lever operated.

tion profiling is shown in Fig. 2, the work in this instance being a cast aluminum movie camera case. Profiling of the recess at top of case, mating with the cover, was combined with profiling the film track inside the case, with floor to floor time two minutes, or 30 per hour. The duplicator—No. 8½-D—was provided with a table, having 2″ extra range, mounted in a fixed position directly on knee of machine, to

FIG. 4. Duplicating an aluminum aircraft part from a wood pattern. An example of emergency short run jobs. Manual control; note light touch of operator on tracer finger.

eliminate overhang. The fixture is air clamping, and an automatic valve turns coolant on and off coincidentally with the clamping. Control is manual.

Still another example of production duplicating, in this case a multi-head job, is shown in Fig. 3. Here, two aluminum parts are produced simultaneously, the segment profiled being duplicated from a single, simple master. (Note, in this set-up, the similarity between this master and the one in Fig. 2). The indexing fixture is lever operated, and electric control is indicated.

An excellent example of tracer controlled duplicating (electric), as applied to experimental rush jobs or emergency short runs is shown in Fig. 4. Here, the operator is duplicating an aluminum aircraft part from a wood pattern. The hold-down bolts, for pattern and workpiece, also serve as dowels, so that when one side is milled, both pattern and workpiece are turned over for completion of the other side. By using a form cutter, the three fillets apparent in the pattern in the foreground are duplicated in the workpiece. In many instances, the cost per pound of profile milled aluminum parts compares favorably with the cost of forging when die and maintenance costs are included.

Duplicating Multiple Core Boxes

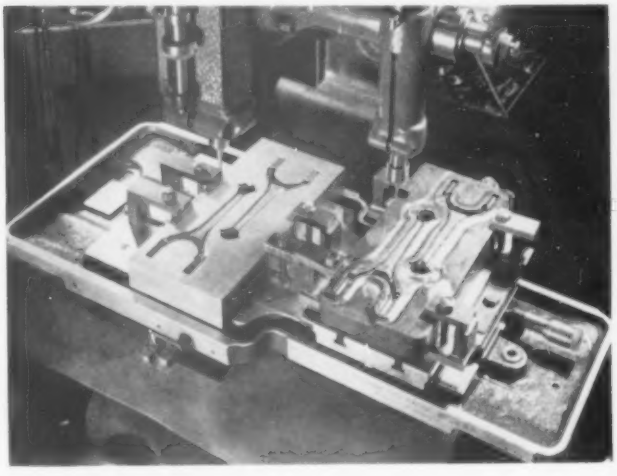
Of a somewhat similar nature is the set-up for duplicating 3 cavity core boxes for automotive cylinders, Fig. 5. The material is aluminum, overall size 7¼″ x 25½″ x 4″ deep, work area 5¾″ x 22″, with depth of cavity 2″. Cutters used, ¼″, ⅜″ and ½″ ball nose and end mills, 2 and 4 flute, with

FIG. 5. Duplicating core boxes from original 3 cavity core box. Electric control. Note tracer head with micrometer adjusting screws.

average feed rate 4″ per minute and cutter speeds depending on their size. The machine is a No. 9-J, and the master the original 3 cavity core box. The limits are plus 0″ to minus .005″, and the cutting time 15½ hours. Finish is exceptionally smooth, with hand polishing reduced to a minimum.

Note, here, the large area of the work in one set-up. Table travel of the electric duplicator, both laterally and longitudinally, is considerably greater than that of the hand

FIG. 6. Duplicating a 2 cavity drop forge die for connecting rods. Manual control, with both cavities cut at same setting by shifting the table.



machine, a feature that saves much time in resetting. In other words, the electric machine is operative throughout the entire range of table travel, whereas the manual is limited to a considerably smaller area.

The original models, as well as models made of wood, plaster—in fact, any material capable of withstanding a load of a few ounces—are entirely satisfactory for use as masters. Machining is continuous, at spindle speeds as high as the

FIG. 7. Duplicating large die on bed type electric duplicator. Operator controls entire operation with a touch of the fingers on the tracer.

material to be cut will permit. All that is required of the operator is to gently direct the tracer finger over the master, the tracer being held in the fingers of one hand.

This process is also well suited to duplicating of tools, such as drop forge dies which, because of their comparatively short life on mass production jobs, must be frequently reworked or replaced. Having the master, one can duplicate these dies *ad infinitum*. Fig. 6 illustrates the duplication of a two cavity die for connecting rods (left) with the master shown under the tracer finger at right. This job is done by

FIG. 8, A. Duplicating an intricate die-casting die for coin chutes, from original die. Manual control.

manual control, and shifting the entire duplicator table by means of the table screws, permits cutting both cavities without resetting. Note in this set-up (as in Fig. 2) the micrometer head for precision setting of the table.

Of a somewhat similar nature, but on a larger scale (comparable to the set-up in Fig. 5) is the duplicating of a 1,500 lb. die block, Fig. 7. The machine is a Gorton bed type electric duplicator, for large and extra large, heavy work up to two tons and 2 x 4 ft. in area. The die block shown is approximately 35 Rockwell "C," with the master of a soft composition known as "Hydro—Cal."

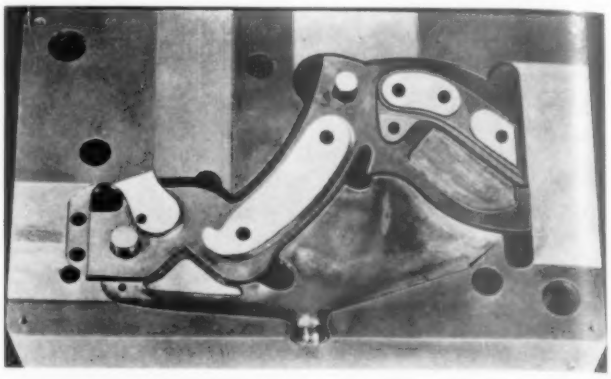


FIG. 8, B. Coin chute die as finished. Note clean lines and excellent finish, which is held to extremely close limits of tolerance.

There is a particular advantage, both in costs and saving of time, in using soft materials for master forms for dies up to two tons, and with electric control the pressure of the tracer finger against the profile of the master is so light that the surfaces are not marred. Note, in this illustration, the manner in which the operator guides the tracer finger, lightly and sensitively held between the fingers of his hand. Speeds and feeds are quickly and infinitely variable by dialing, and the whole implies an absolute control of every phase of operation from floor to floor.

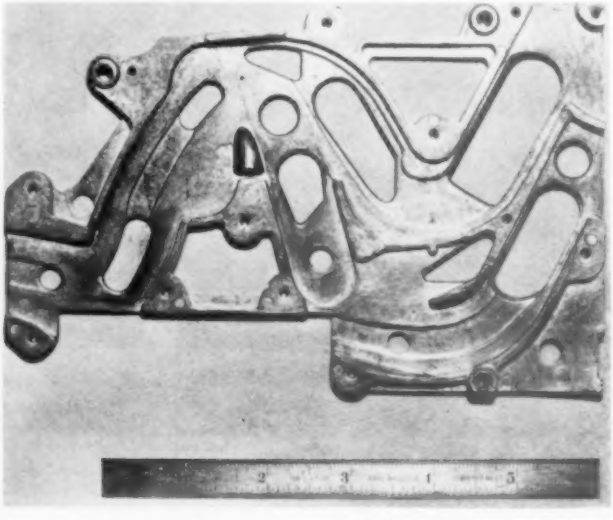


FIG. 8, C. A coin slot, made from a similar die of somewhat different shape but suggestive of the finished product.

Of particular interest, because of its intricate pattern and tracery, is the profiling of a die-casting die for lead base coin chutes for telephone pay stations, Fig. 8, A, B and C. Ordinarily, a job of this kind would require about 100 hours if laid out by hand and cut to line; as it was, the job was completed in less than 37 hours (actual cutting time less than 30 hours) on an 8-D Duplicator with manual control.

The job included accurate spotting of several ejector pin

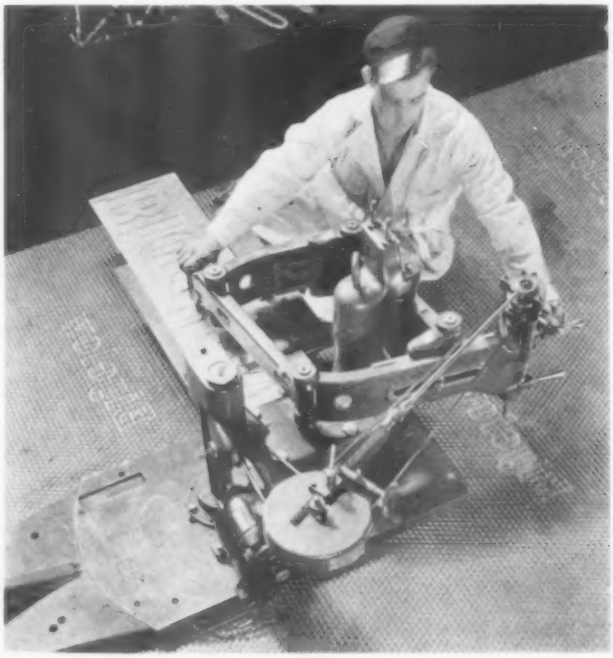
to permit drilling instead of jig boring, as well as cut-out cavities around the several bosses and other contour ...ling. The material was oil hardening tool steel; stock ...oved $\frac{3}{16}$" and $\frac{1}{4}$" at deepest points. Finish required to ...smooth, clean cut and as free from tool marks as possible. A number of cutters were used, ranging from .050" to $\frac{3}{8}$" ...meter, with tracing styles to correspond. Speeds of 250 ... 2,000, on the roughing cuts, were stepped up to 7,000 ...M in finishing. The original dies were used as masters, ... limits of tolerance were held to plus or minus .001"— ... several sections within .00025". The complete set-up is ...own at A, with a finished die (lower half) at B. C shows a ...in slot of somewhat similar shape made from another die.

FIG. 9. Main core for aluminum alloy automobile piston, produced on manually controlled duplicator. Note exceptionally fine finish on hard, tough material.

Another example of tracer controlled duplicating is shown in Fig. 9. The part is a main core for aluminum alloy automobile pistons, the three sections being made from Vibro-steel forgings, machined all over to limits of plus or minus .005" in less than 15 hours, floor to floor. This is a typical example of what can be done with tough, hard materials, yet the finish is exceptionally clean and smooth. This job, too, was by manual control.

So far, we have presented typical examples of identical size, tracer controlled duplicating, with the work within range of the machine. We now bring the machine to the work, as shown in Fig. 10, A and B. In this case, the job is a large hot press die—far too big to be conventionally mounted on any machine—to be engraved with a trade mark, the latter to be impressed into sponge rubber cushions for large rugs.

FIG. 10, A. "Out size" engraving, on large hot press die, with tracer controlled pantograph reducing machine. Machine positioned on work by means of a crane.



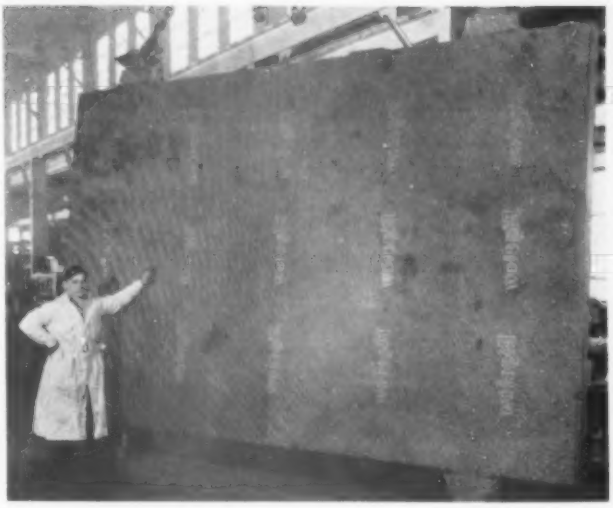


FIG. 10, B. The above illustration gives an idea of the size of the die in comparison to the machine used for engraving the trade marks.

The machine used is a tracer controlled Pantograph Reducing machine, Gorton 3-S, which is rigidly supported on a heavy bed plate and placed on the work and positioned by aid of a crane. Lettering, $\frac{1}{8}$" deep, was cut in the semi-steel platen, using standard cutters and a special copy master about two times oversize. Some idea of the size of the finished job may be had from Fig. B.

Taken as a whole, we have shown a cross section of the scope and adaptability of tracer controlled millers for a wide range of work, not only in the manufacture of tools, but in the mass manufacture of consumer goods. Versatile and sensitive, and widely adaptable, machines of this type hold a unique place among the Tools of Today.

$1000 Prize Contest on Resistance Welding

Four prizes totaling $1,000 are offered by the Resistance Welder Manufacturers Association for papers on resistance welding. Now under way, the contest closes at midnight, July 31, 1945, and awards will be announced at the fall meeting of the American Welding Society. Competition is open to men in the industrial welding field, consulting engineers, government laboratory technicians, and the like, and to instructors, students or research fellows at recognized universities.

Details and rules may be obtained by writing the Resistance Welder Manufacturers Association, Citizens Building, 850 Euclid Ave., Cleveland 14, Ohio.

Nelson Promoted by Detroit Broach

David A. Nelson, long prominent in the Broaching industry, has been appointed vice president and general manager of Detroit Broach Company. He was previously manager of the company's West Coast plant.

Before joining Detroit Broach Company, Mr. Nelson had been associated for some eighteen years, with the Colonial Broach Company, latterly in the position of secretary-treasurer.

By Joe Dostal

Broaching Solves Difficult Production Problem

An achievement in tool engineering, in which quality and high production are attained through unusual applications of usual techniques

THE JOB—a Tank Pin and Bushing—consisted of two mating parts; a pin (Fig. 1), 22 13/16" long, and a bushing (Fig. 2), 7" long. Two bushings were required, and one pin, per unit. The pin had two opposed slots, running its entire length, also, four flats crosswise to the axis, while the bushing had two inverted keys which were required to mate with the longitudinal slots in the pin.

The two slots, in the pin, had to be accurately held for angularity, width and depth, and centrality had to be maintained for the entire length, otherwise it would not assemble or disassemble in the field. To add to the difficulties of manufacture, the pin was cadmium or zinc plated after machining, and a 100 per cent inspection test for all dimensions was performed after plating.

Joe Dostal **was graduated in engineering in Milwaukee where, after a practical shop course, he joined the A. O. Smith Co. Later, joined the Detroit Pressed Steel Co., now, a division of Midland Steel Products. With Eaton Mfg. Co. 25 years, where he is now vice-president and gen'l mgr., he has played a prominent part in the development of Permanent gray iron casting techniques.**

The pins were made from alloy steel, and heat treated to 40-46 Rockwell C, while the bushings had a hardness of 38-40 Rockwell C. At the beginning of manufacture, the finished diameter was held plus or minus .0005". Later, this was modified to plus .001", minus .0005", still very close and indicative of the accuracy to which all dimensions were held.

When the parts came in for estimating, it was necessary to determine how they were to be made. The diameters, flats and other dimensions, while close for a part that long, were routine and presented no particular problem beyond the usual mechanical skill. But, the slots in the pin were an entirely different matter! The question was:—would they have to be milled or could they be broached? And, the concensus of opinion was that the only way the slots could be held to blue print was by milling a slot on one side, and then turning the part over and milling the other side.

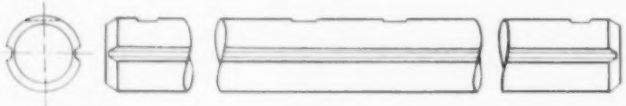


FIG. 1

The responsibility of decision rested with the writer, and it was his opinion that there would not be enough milling machines available to take care of the requirements. The slotting and flats would therefore have to be broached. As a matter of fact, milling between centers, and then indexing the part, seemed hardly practical since the longitudinal slots extended the entire length of the pins, hence, the cut would have to be stopped, then picked up after resetting. Anyway, milling precluded the speed necessary to meet production schedules, so, broaching was decided on.

To make sure he was right before quoting on the contract, the writer consulted with several of the established broaching machine manufacturers. After considerable study and discussion, their engineers decided that, while broaching had possibilities, the part presented too many problems for immediate attention. They therefore recommended milling, not necessarily as the better method, but as a way of getting started quickly!

However, the writer would not take "no" for an answer, so, over the week-end, conceived an idea for a fixture which, in his belief, would do the job if the right tools and broaching machines could be made available. Early on Monday,

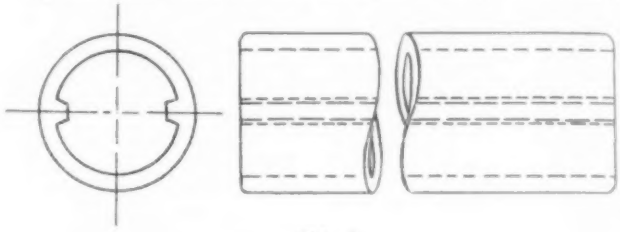
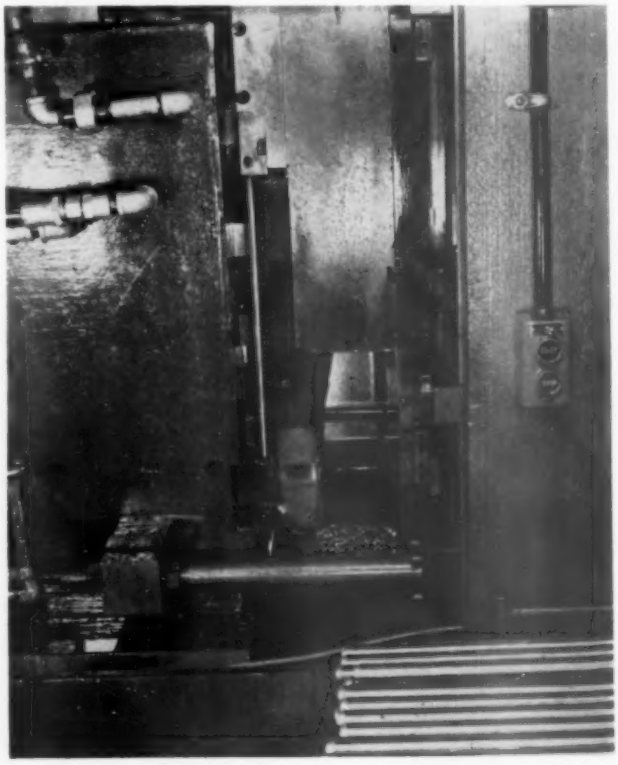


FIG. 2

armed with this idea and figures, he again called on the broaching experts who, after studying the design, reiterated their opinion that broaching was practical. But, loaded as they were with orders, their best delivery date was months ahead. And, the job called for immediate action!

Adverse opinion and obstacles to the contrary, the writer

Fig. 3. **Straddle broaching the longitudinal, opposed slots in the pins. The pins are located in Vees, and locked in place with self-aligning, hydraulically actuated clamps. Slots are broached, both sides, in one pass.**



nevertheless quoted on the job as a broaching proposition, and the contract for manufacture was secured on that basis. This done, there was no choice, and the next step was to get the necessary broaches and broaching machines.

It was then that the writer took his troubles to U. S. Broach Company and put the problem in the lap of the U. S. engineers. The entire tooling up—Broaches, Fixtures, Gages—was contracted with them, and from then on things began to hum. Not only did they agree that broaching was the proper procedure for machining the slots, but they went one better and cut two slots in two pins at one stroke of the ram—tantamount to two finished pins per stroke.

Fig. 4. Broaching the flats on the pins. This illustration gives an idea of the general plant layout and sizes of equipment.

Fig. 5. Close-up of fixture used for broaching flats on pins. Note simple and sensible method of hydraulic clamping.

While some difficulty had been expected, due to the extreme length of the slots, we were agreeably surprised that the fixture and broaches were the least of our troubles. They worked perfectly! The rugged fixture clamped the work securely, and the broaches performed accurately and efficiently. Most of the delay and difficulty was in the broaching machines, it so happening that, when it came to broaching the bushings, pull-down machines were not available at the time of tooling. As a consequence, we had to convert several surface broaching machines, with 66″ stroke, into pull-down machines. Of this, more later.

With regard to the pins, tooling included a double fixture, holding two pins, to straddle broach the longitudinal slots. The pins were stood on end in the fixture, and were locked with hydraulic clamps on the outside diameter. The fixtures were approximately 34″ high, 28″ wide and 24″ deep. The

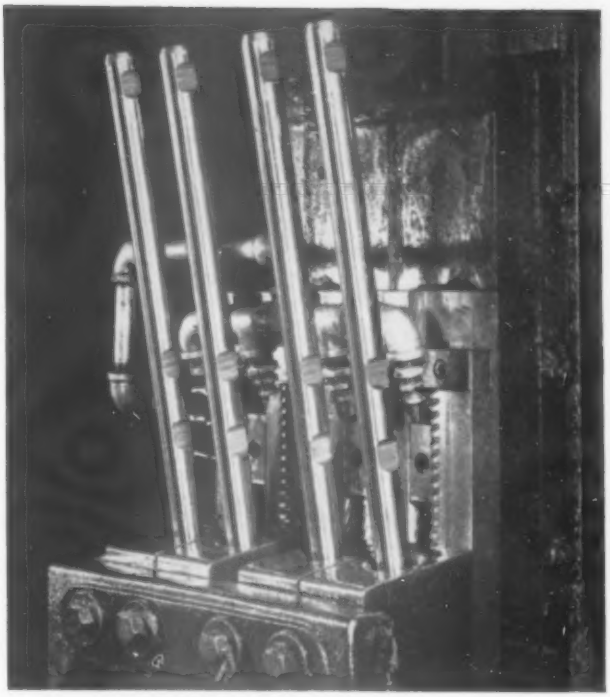


Fig. 6. Broaching chamfers, at ends of slots, both ends. Four pins are broached simultaneously, then turned 180° for opposite side. They are then turned end for end, and operation repeated. This set-up is tantamount to one finished pin per pass of the ram.

main problem, on this operation, was to hold the pins in absolute squareness so that the broaches would produce a straight slot, also, to hold angularity. These conditions were fully met, and at a production rate of 4000 pins per day.

Operation for Broaching Four Flats on the Pin

This operation required one fixture, to do one pin at a time in order to balance the production of 4000 per day. On this operation, the pins were loaded from one side, and lo-

Fig. 7. Broach I. D. and inverted splines in bushing. Job done in two passes, equivalent to one finished bushing per pass.

cated from the inverted slots in order to insure the proper angular relation between slots and flats. The important thing, during this operation, was to clamp firmly so as to prevent any rolling due to the pull of the broaches. This was also accomplished by means of hydraulic clamps.

A third operation, on the pins, consisted of broaching a leading chamfer in each end of the longitudinal slots. This was done on a small broaching machine, with a fixture that held four pins at a time. Pins were located, in the fixture, from the longitudinal slots, and, after the first pass, were, rotated 180° to complete chamfers on one end. The pins were then turned, end for end, and the opposite end chamfered.

Broaching the Bushings.

As previously intimated, the bushings presented a more vexing problem in that no machines of the desired type were available. Entirely aside from expense, deliveries were

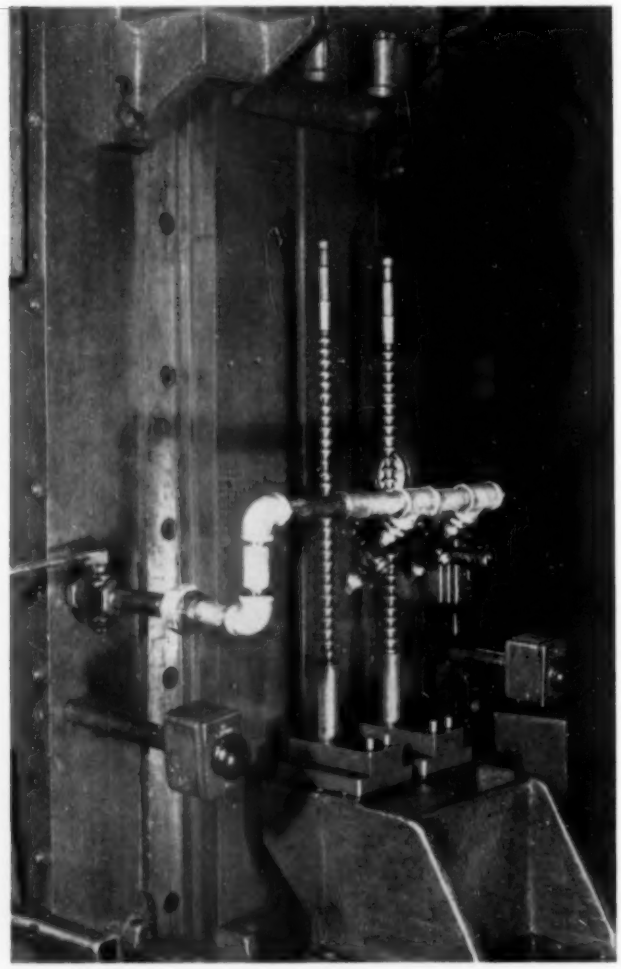


Fig. 8. **Close-up of broaching set-up for bushings. See text for full description of operation.**

quoted in the remote future. Therefore, the problem was to convert six standard slab broaching machines to special pull-down machines, with broach retrievers that would prove dependable in the hands of unskilled operators.

In this connection, it may be stated that the manufacture of these bushings and pins was done in the Vassar, Michigan, plant of Eaton Mfg. Co., and this plant is normally a Gray Iron Permanent Mold Foundry. Also, the operators—in this case girls—were obtained from adjacent homes, restaurants and farms. Despite all that, the major changes were made and the whole proved so successful that the machines operated night and day until the contract was completed.

EDITOR'S NOTE

The job described in this article is typical of the sa- ing, popularized during this war, that: "The difficult we do promptly, the impossible takes a little longer." At any rate, it posed vexing problems of timing and co-ordination, as well as of methods of processing. The result is an example of outstanding tool engineering.

While the author modestly disclaims all but a very moderate share of the credit, final solution must nevertheless be accredited between two bodies—one, an insistent rebel against convention (Joe Dostal) who first conceived the idea and then "sold" it to a receptive "purchaser"—the U. S. Broach Company, of Detroit. The one conceived the "impossible," and with the unstinted co-operation of the other, made it possible.

Commenting further on the bushings, they were—as previously stated—7" long and internally broached with two inverted keys to fit the slots in the pins. The machines used were standard, dual ram broaching machines of 66" stroke, converted to pull-down, each pulling two broaches at once.

As originally planned, the job was designed for three passes, to complete broaching the inside diameter and the two inverted splines. As a result of careful study by our broach supplier, however, we were enabled to complete this job in two passes, thereby increasing production by one-third. As a consequence, the estimated output of 8000 bushings per day was not only attained, but greatly exceeded.

Gang Broaching Boosts Production

Summing up, then, all operations, outside of turning and grinding outside diameters, were completed by broaching. Of these operations, the pins required three, viz: Broaching two longitudinal slots in each pin, but broaching two pins per pass; broaching the flats, and broaching the chamfers, the latter also a multiple pass operation. The bushings, in turn, required two passes.

Now, referring to the illustrations, Fig. 3 shows the straddle broaching of the opposed slots, in the pin. The parts were centered in Vee blocks, and clamped with equalizing, hydraulically actuated clamps, the operating lever of which is shown at lower left of photo. The slots were broached in one pass.

Fig. 4. gives a general idea of layout, for broaching the flats, also, of the size and disposition of equipment used. Fig. 5 shows a closeup of the fixture used for broaching the flats, also, of the surface broaching machine used, and the broaches. Note the massive yet simple fixture, and the simple hydraulic operated clamps. During this operation, the pins had to be held in angular relation to the longitudinal slots, also, had to be securely locked to prevent roll from the pull of the broaches.

Fig. 6 shows the next operation—broaching the chamfers, for lead-on, at the ends of the slots. Four pins were broached simultaneously, then, the pins were turned 180°, to broach the opposite side. They were then turned end for end, and the operation repeated. As set up, this gave production of one pin, chamfered, per pass of the ram.

The three preceding operations, described, completed the broaching pins. With regard to the bushings, they were internal broached, for I.D. and inverted splines, as shown in Figs. 7 and 8. As worked out, this operation entailed considerable ingenuity, both in converting standard push type machines into pull-down, and in the method of retrieving the broaches. The fixtures, of course, are extremely simple—which in itself might imply some ingenuity.

Fig. 9. Single broach, used for broaching the longitudinal slots in the pin.

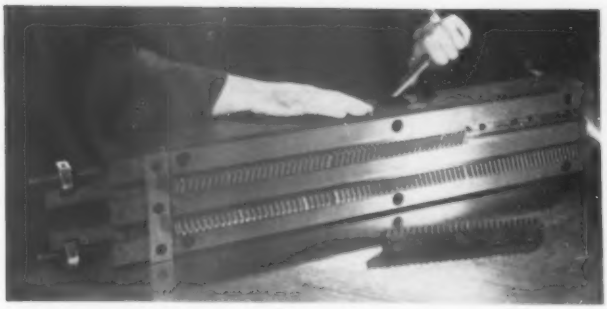


Fig. 10. Dual broach, as used for broaching flats at center of pin.

The fixtures consisted of work holders, holding two tubes (bushings) at one time. After they were placed in the fixture, the push buttons were pressed which started the upper ram (which held the two broaches) down through the bushings and into the broach puller on the main ram under the work holder. The puller then pulled the broaches through the work, when they stopped.

The parts were then removed, and the push button pressed which moved the main ram upward until the broach puller hit the bottom of the fixture. This, in turn automatically released the broaches, which were picked up by the upper broach retriever—all accomplished in the same cycle, without stopping.

In other words, the two bushings were placed in the fixture, when the upper ram pushed the broaches down through the work-pieces until gripped by the broach puller, below. The cutting stroke was then completed, and the work removed, when the main ram ascended to a definite stop. Then, the broaches were picked up by the retriever, above and raised high enough so that the succeeding parts could be inserted into the fixture, when the cycle repeated.

As explained, it all sounds very simple, but considering that the broach retriever was hydraulically operated, and that the relay and stop switches had to be co-ordinated so that, by pressing a button, the entire operation was automatically performed, the complete set-up was quite an achievement. The more so since the entire tooling, with incidental conversion of machines, was accomplished in a matter of weeks. And, the tools operated perfectly!

The credit for the job is largely due to the engineering skill of Mr. Penny, President; Mr. Ty Miles, Chief Engineer; and Mr. Arthur Atwell, Supt. of U. S. Broach Company, and others in the U. S. Broach organization who gave unstintingly of their time no matter what time of day or night they may have been called in. Considerable credit is also due our electrician, at the Vassar plant, for his ingenuity in co-ordinating the various units in the machines, as converted. Between us, we got results.

Unique Heating Equipment Speeds Heat Treating

By Gunnar Skog

AN INSTALLATION of heat treating equipment, jointly designed by General Electric Company and Curtiss-Wright engineers, and now used to heat treat aluminum alloy aircraft parts at the Curtiss-Wright St. Louis plant, has wide application throughout industry. The system is unusually fast, as may be judged from the fact that a work load of 1200 lbs. of aluminum alloy, together with its 900 lb. truck, can be heated from room temperature to 930°F. in less than 25 minutes. Provided, that is, that the furnace is already stabilized at the higher temperature prior to loading.

Essentially, the equipment consists of a General Electric Roller-Hearth electric furnace, with loading and control stations, and a quench chamber, the latter the design of Curtiss-Wright. The latter includes an unique, automatic water spray quench which minimizes the distortion that often results from quenching. The installation also includes a push button controlled load truck which eliminates the human factor in addition to providing a centralized operating position. In addition, a precision temperature control is incorporated which stabilizes the heat as the temperature reaches the control point, and thereby prevents "overshoot." The furnace, which is 21 ft. long x 19′-6″ overall height, has three seperately controlled heating units mounted on the walls, and four 28″ motor driven fans mounted on the top. The latter recirculate about 50,000 cu. ft. of air per minute. The lift type door, which is tightly sealed in the closed position by an air operated clamping mechanism, is provided with a two-speed motor hoist which slows down the door at the end of the travel, thus cushioning the shock of stopping. The overall length of the installation, which is shown in Fig. 1, is 58 ft.

The load truck, which is shown just under the floor of the quench chamber, rides on a "roadbed" provided by a triple line of rollers, and is pulled in and out of the furnace by a reversible transmission driven by a two-speed, high-torque motor. Made of heat resisting alloy, the truck is made in four sections coupled together, this construction providing flexibility as well as minimizing the distortion that results from repeated heating and cooling.

Remote, Push Button Control

The conveyor is controlled by a push button station located near the front of the furnace. The truck is loaded—as in the foreground in Fig. 1—when the operator pushes the "Load to Furnace" button. This starts the conveyor motor, when the truck moves through the quench chamber, the door of which is open except when quenching. Simultaneously, the furnace door is hoisted, stopping when it hits a limit switch, permitting the truck to pass directly into the furnace. The

truck then hits a limit switch, when the conveyor motor stops and the door closes. The load is then soaked at heat treating temperature for the required interval of time.

The heat completed, the operator then presses the "Furnace to Quench" button, when the operation is reversed—i.e., the furnace door opens, when the load moves into the quenching chamber. Once in the chamber, the furnace door closes, as does the door of the chamber in the immediate foreground. The load is then quenched.

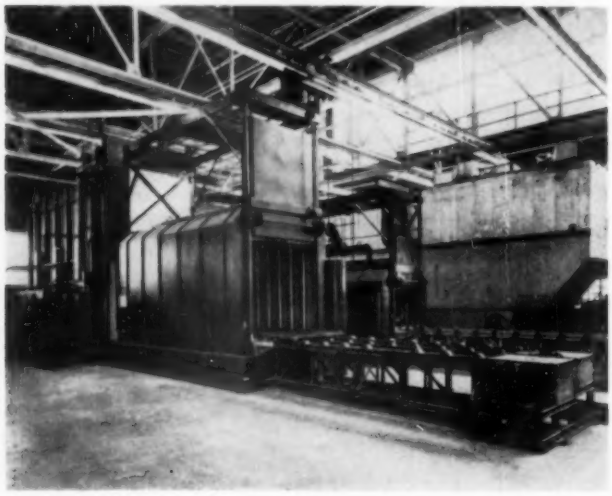


Fig. 1. Roller-Hearth Electric Furnace and allied equipment for heat-treating of aluminum alloy sheets. In plant of the Curtiss-Wright Corp., in St. Louis, Mo.

The "jet" quench, details of which are shown in Fig. 2, consists of 300 nozzles through which pass approximately 2000 gallons of water at each quench. The spray, which lasts for about 30 seconds, is pump circulated, the water returning to the supply tank after each quench. Water temperature is held to 100° F., and is drained off and replaced with cold water in the event that temperature should reach the limit.

As soon as quenched, the operator presses the "Furnace to Unload" button, when the chamber door opens and the truck returns to its original position in the foreground. It is then unloaded, when, after reloading, the cycle is repeated. A fifth button, painted red and larger than the others, is for emergency stop purposes.

In addition, there is a selector switch located in the control cabinet at the rear of the furnace. When turned to "Manual," this switch permits the operation of push buttons which provide for independent control of the conveyor, quench and furnace doors, and the quench valves. For complete automatic operation, however, there are included suitable limit switches, water level switches and solenoids. The control panel is shown in Fig. 3.

Electric "Brains" Control Heat

Main power, for the heating units, is supplied from the power bus line through three 3-pole, fusible switches mounted on a power panel. From there, it is brought to the furnace through three controlling or "throttling" reactors. The effect of these reactors, in the circuit, is varied by Reactrol power panels which, in turn, are governed by temperature controllers. The latter derive their "information," independently, from chromel-alumel thermocouples located near the fans at the top of the furnace.

Because the fast heating cycle requires a high rate of heat transfer early in the cycle, a continuous power flow type of control is used. By continuously controlling input, and by continuous throttling, "overshoot" is prevented both as the temperature reaches critical point and during the soaking period. Since there is never any actual interruption of the circuit, this control is much easier on the power system than the usual "on and off" type.

The saturable-core reactor, which consists of a laminated iron core with three windings, serves as a valve to regulate the amount of electric power flowing to the furnace. It has two A-C windings, which are connected in series with the furnace and the main power supply, and a D-C winding which is connected to the Reactrol panel. With no current in the

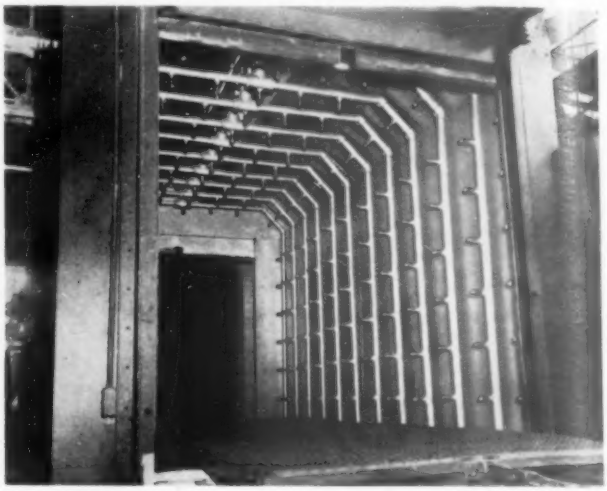


Fig. 2. "Jet" quench used with Roller-Hearth Electric Furnace. Close-up interior view showing some 300 nozzles attached to series of co-axial pipe loops.

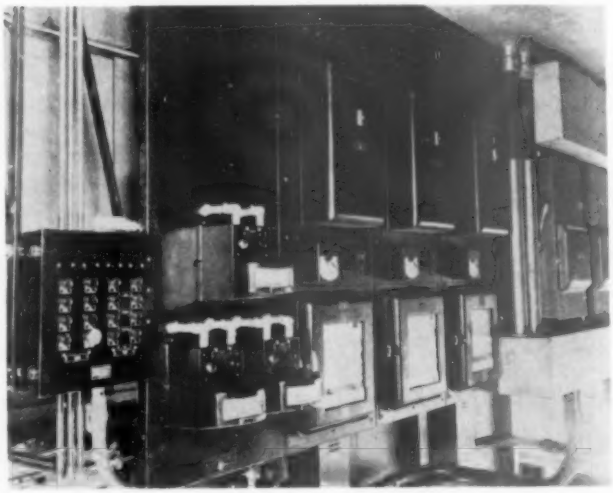


Fig. 3. Control panel of Roller-Hearth Electric Furnace. Oblique front view (from right) showing push-buttons for operating conveyor (extreme right) and also various push-buttons for independently operating furnace and quench doors and quench valves.

D-C winding, impedance of the A-C windings is high, and most of the power-supply voltage appears across the reactor. As a result, power input to the furnace is at a minimum. The reverse occurs when maximum current flows in the D-C winding, in which, by varying the current, intermediate values of power input are obtained.

This installation is for massive requirements, yet so precisely controlled, and so accessible, that it provides for unusually fast heat treating with a minimum of operator effort. Also, its compact design (its greatest dimension is vertical) provokes serious thought toward wider application in the mass production field, especially since loading and unloading could be accelerated by a cross-track on the conveyor when, by using two trucks, one could be loaded while the other was in the furnace. Taken as a whole, it is a nice piece of engineering.

By John H. VanDeventer,

President, *The Iron Age*

Postwar Expectations Versus Realities

Full employment and high wages can come only with increased production under private enterprise. Pressure for government controls must be combatted

POLITICIANS, BOTH HERE and abroad, and labor looters have led many to believe that out of the welter of destruction of wealth and work by war they may expect better wages, shorter hours, a free insurance policy covering all of the hazards of birth, life and death, a guaranteed annual income, full employment for everybody and a higher standard of living through increased purchasing power.

If that were the way to raise the scale of prosperity, we should hold annual bonfires in all of our communities and burn up most of our possessions.

Creation, not destruction, makes wealth. The sooner we get that into the heads of everyone the better it will be for us and for the rest of the world. And hard work is the basis of the creation of values. It's a sounder basis than WPA's or lend-lease.

Speaking of work, I wonder if any of us really knows what it means.

In Adam's day it was regarded as punishment inflicted for sin. Our fathers and grandfathers considered it as a duty to be performed and a privilege to be had. In our generation it is looked upon as a right of possession accompanied by a meal ticket.

Clear Thinking Required

This conception of work as a right, without an equally clear conception of the responsibility accompanying the exercise of that right, is our outstanding post-war social liability. Like all half truths, it is more dangerous than a complete falsehood. It has come into being as a concomitant development of the machine age, which by making work easier has too often bred contempt for it and developed a hitch-hiking economic philosphy in millions both here and abroad.

After all, there were few hitch hikers before the invention of the automobile!

Great expectations are fine if you are willing to work for them. But they cannot be attained and maintained in a bottleted economy with the United States Treasury acting as the milkman. In industry they must be earned individually through constantly increasing efficiency and productivity.

The misconception of work, as a right to have and hold a job regardless of the social value of the work performed in that job, together with the expectation of more reward for less effort in our post-war economy, is number one of six powerful pressures that threaten to force this country and Great Britain as well into State ownership and State socialism.

Before proceeding to the other five, I want to say a few words more about political promises of jobs for everybody, which are a part of State ownership pressure number one.

If you are "able and willing to work," in the post-war world there should be a job waiting for you, according to the thinking of our modern political economists. There are provisos, however, that are never mentioned because they would not be politically popular. These are: "Provided the work you are capable of doing fills a need; provided the pay you receive for it is commensurate with the service rendered, and provided some employer creates the necessary employment."

There are just two kinds of employers to whom you can look for work—private and public. It has been promised that if private employers cannot make jobs for everybody, then the public employer, namely Uncle Sam will.

Private employers in America have had the most experience in creating and maintaining employment, having previous to the war provided 85 to 98 per cent of all available jobs, in good times and bad. Private employers pay better wages all along the line for work they want done than does the public employer in spite of the fact that they have to be self-liquidating in their operations whereas the government creates employment by liquidating the taxpayers.

Private employers have manufactured employment or jobs at a profit. Government almost invariably does so at a loss. Even during the 10-year pre-war period, 1930-40, public debt increased 75 per cent while private debt was reduced 25.5 per cent in the same period.

More Employment and Public Service

Private employers have not only created more and better employment than has the government and made it while reducing its burden of debt, but they have better served the public while so doing as measured by prices charged for goods and services.

But so firmly have these "something for nothing" ideas been implanted in so many, that when employment and wage actualities collide head on with expectations, in the post-war years, there will be a tremendous popular demand for the continuance or even extension of national debit financing which is the only way that, temporarily, we can get something for nothing. And that's national highway number one leading to State socialism.

Pressure number two is confiscatory taxation. In our own country most of our successful companies (and the unsuccessful ones do not count) are already paying 90 per cent of most of their profits to the government. In the United Kingdom, it is 100 per cent. Stock shares become merely paper symbols of ownership when these overwhelming proportions of the fruits of enterprise are harvested by and put at the disposal of bureaucrats.

Less Private Investment Capital

Emerging from this, is the fact that government, as the expropriator of the profits of existing enterprises, puts itself in position to become the principal proprietor of new and future business through the process of draining off private investing power and centering it in the state.

Third pressure toward State socialism is the political propaganda here and abroad for the nationalization of industries. Labor, both in Great Britain and America is bending its efforts in this direction, not without sympathetic attention from certain lawmakers and lawgivers who know that more government ownership means increased power for those who govern.

Thus far the attempt is confined to the basic industries such as coal, steel, transportation and power. But once a wedge enters there is no telling how far it will go. Once the basic industries became nationalized it would be a short trip to the taking over of the automobile, machine tool industries, telephone and telegraph, mail order houses and chain stores.

We are not yet sure how much stage setting there is in the Montgomery-Ward case.

Fourth pressure toward socialization is the proposal to govern international trade by means of cartels. The cartel is not a new idea.

America, like most of the rest of the world, has been living in a frozen economy. Jobs, wages and prices are frozen and the rigidity of regimentation has encased management, labor and the public alike in an icy armor in which initiative, growth and progress have been immobilized at the status quo ante.

Most of us accept the necessity for this glacial period in our economic life because we are told it is necessary in order to win the war—to win a war to make the world free. But unless we become unfrozen, we will never be free.

That is something for all of us to ponder who are looking forward to a new period of fertile growth after victory—to the time when we can freely plant our crops of ideas and efforts once more and be free to reap the harvest.

Cartels Kill Progress

Undoubtedly the cartel is the most effective, quick freeze for immobilizing economic progress ever invented. It eliminates competition and thereby kills the greatest stimulus to progress.

If you do not want to live in a perpetual Ice Age after the war or die of economic frostbite, then you should oppose at every opportunity the attempt to freeze progress in the cartel refrigerator.

Fifth pressure toward state ownership and hence toward socialism is the tremendous growth of State landlordism and proprietorship of the means of production taking place in the United Kingdom and America.

In both countries Government now owns and controls a very large share of our production facilities. In our country this is through the DPC and in the United Kingdom through the "shadow plants."

But State landlordism extends beyond this in both countries in the form of ownership of land and dwellings. In England this trend has been and will be tremendously accelerated because of the destruction of private homes and the need for reconstruction which is officially appraised as representing ten years labor for one and a half million workers.

Private enterprise cannot tackle this job because of the disparity between investment and returns. It's beyond the reach of the profit motive.

Because such housing cannot be built on a self-liquidating basis, the municipality which of course is the State, must build them. And State ownership of houses in these sections will rise from a normal pre-war average of about 10 per cent to a postwar average of from 30 to 60 per cent. Asking how the difference between investment costs and rent paid would be met, I was told that it would be by raising the already terribly high tax rates on private owners in these localities. You can imagine what this will do to private ownership.

British Factories Little Damaged

Fortunately, or unfortunately as one may regard it, there has been exceptionally small damage done to British industrial plants by bombing. The principal damage has been, even in such cities as Coventry, to workers' houses, churches, stores and buildings in the business centers. Thus the increased production capacity in the form of the British shadow plants, government owned, remains as an already accomplished extension of Government ownership of facilities.

In our own country, while we have had no demolition damage by bombing, we do have an increasing trend toward Government landlordship of homes and dwellings, represented in slum clearance, emergency housing and other projects. But in the field of industrial production facilities, the State has gone considerably further than our British cousins. It now owns more than half of our aluminum producing facilities, more than enough rubber producing capacity to satisfy all postwar demands, a considerable share of our machine tool producing capacity, more than 90 per cent of our magnesium capacity, more than 90 per cent of our aircraft making facilities and most of our shipbuilding facilities and ships.

If private industry is unable after the war to live up to what the public has been led to expect in the way of employment, then this existing large percentage of State ownership of means of production will provide a ready made handle for socialistic planners and their followers.

Government Control of Education

The sixth pressure toward socialization, both here and in Great Britain is that toward the Government financing of higher education. Across the water, plans are now being made to have the British Government assume as high as 80 per cent of collegiate financing while in our own country the same principle is being developed through selected and proposed veteran education. Excellent in principle as affording free education to those best fitted for it, this plan entails a serious threat to the liberty of thought so cherished by our schools of higher learning. For when Government controls our universities, then politicians and bureaucrats will inevitably attempt to dictate what is taught and who teaches it.

Up to now you may think I am a pessimist. V-E Day is history—and thank God it is—so why let these things annoy you?

War News Overshadows Economic

Because with continued victories on all fronts—because of the Dumbarton Oaks and San Francisco conferences—because unspeakable atrocities have crowded the front pages of our papers and blared from radios,—we may have forgotten in the excitement that Monday is still wash day in most American homes. The most significant news is often buried inside the paper in small, headless stories.

What can we do about it? Are we to accept these pressures as inevitable, take them sitting down, so to speak, in a spirit of fatalistic resignation, or shall and can we operate a counter-offensive? Let's see what's behind these pressures. Most of the pressures that I have cited, with the exception of that toward nationalization of industries, and the exaggerated promises to labor, have not arisen from planning but have come through the economic distortions of war.

Who in our country wants State Socialism? Employers do not, investors do not, management does not, the great bulk of labor, organized and unorganized does not, the great majority of our legislators do not. A public opinion survey would probably show far less than 10 per cent of our people in favor of it.

Aggressive Minorities Create Pressure

The unfortunate thing is that the 90 per cent who do not want it are doing next to nothing about it because they do not realize the existence, the extent and the power of these pressures.

In Italy, in Germany and in Russia, minorities of even less than 10 per cent succeeded in putting over Fascism, Naziism and Communism because they took advantage of

the economic pressures working with them and because the other cent did not realize what was going on.

The job facing those of us who want to do something about it is twofold. The first part relates to information, the second to action. Of these two, the first is the more important.

Convince enough people of what is going on and what will happen to them if it keeps on going and the action will be forthcoming.

It seems to me that in this connection, organizations such as the ASTE have both great responsibility and opportunity.

You speak for a distinctively dynamic cross-section of industry, which in eight short years you have made articulate. You have seventy chapters and two more coming up this month. You are represented in almost every important industrial center from coast to coast. You have a fine educational medium in the "Tool Engineer." Your young society with over 18,000 members is one of the largest technical organizations in the world. You are maturing rapidly. *Now is your time to assume your obligations—professional, educational and social in the national economic picture.* You possess the necessary channels of distribution to reach every employer, large and small, in manufacturing. You can inform them of the existence and the seriousness of these pressures and what it will mean to everyone if they are permitted to grow and to proceed unchecked.

Fanning out from this could and should be a concerted effort by employers to enlist labor as cooperators in checking these pressures.

I do not believe that there is a single top labor leader in this country who would welcome State Socialism for the simple reason that it would automatically abolish his job. Unionism and State control are incompatible. The regulation now existing over wages and nature of employment, because of war, would not merely be continued but increased. State ownership would inevitably mean the abolition of the right to strike as well as the right to choose or change one's job.

Employer-Worker Co-operation Needed

Employers must take it upon themselves as a duty to convince their workers of the necessity of cooperative effort to keep America free. This selling job, in importance, takes precedence over that of selling the product which you manufacture, because we cannot overcome these pressures unless labor works with us. Neither management nor labor leaders can be aloof to this responsibility.

If we are to hope to win this great coming postwar economic battle against Government ownership which is merely national defeatism, employers must become more self-reliant. If we do not want Government to become the employer then we ourselves must create the necessary employment. We must keep out of the dog house.

It was not labor or the Government that put us in the dog house in the 1930's. Industrialists and business men did that for themselves by admitting they were licked and running to Washington for help.

We must not repeat that mistake. If we do not want Government to become the employer and thus compete with private enterprise, then we ourselves must create the necessary employment.

Good men are at work on that problem today. I refer to the Committee for Economic Development, the non-political organization headed by the able Paul Hoffman. I consider it one of the principal forces today opposing the onward march of the pressures toward State Socialism.

How can private industry and labor create the necessary additional employment to keep Government from taking over that function? There is only one way as I see it and that is by making more goods and services available for more people at lower cost.

Labor, perhaps, has the largest stake in cost reduction as a post-war policy because labor wages constitute over 85 per cent of our total National buying power. Ten thousand times more wage earners ride to work in their own automobiles as do industrial magnates and Wall Street operators. And a reduction in the price of homes, of shoes, of clothing or automobiles, or food means a great deal more to the man getting $40 a week than it does to one getting $400.

There is no question whatever that if management and labor would exert themselves to their fullest capacity in light of present technique, American industry could double its output and cut cost and price at least 33 per cent, which would mean a corresponding boost in the standard of living of the average man.

Two very understandable objections prevent labor from joining in this objective. One is the creation of unemployment through the surplusses of production. The other is the immediate and temporary unemployment resulting from technological improvement and change-over to peacetime goods. If we can jointly solve these problems, and I believe that we can, then the threat of "great expectations" as a pressure toward Socialism will be changed into the strongest possible counter-pressure against it, through the cooperation of labor.

Management—Labor . . . and Government

But management and labor together cannot achieve success without the cooperative effort of the third partner, Government.

There is an old saying that: "He governs best who governs least." I would qualify that saying also, "who governs most intelligently."

If our Government is sincere in its belief in the continuance of private enterprise, and I think it now is, then it should be willing to do what it can to make private enterprise function—to make it create employment—to make it possible for it to pay the best possible wages in terms of purchasing power, which is the only logical and worthwhile measure of compensation.

Government cannot do that by *competing* with industry. It can do it by *working with it*. The function of Government with respect to industry should be one part necessary regulation and nine parts encouragement. But how can Government proceed to develop a favorable atmosphere for industrial growth unless it knows what industry is?

Sell Congress on Industry

I am thinking now in terms of our National legislators. We hear of committees from Congress being sent to Europe and the British Isles and Australia in order to appraise and visualize the World's post-war problems. *I would like to see similar committees appointed to visit Cincinnati, Pittsburgh and Detroit, Dayton, and other industrial communities,* to see first hand where and how creative work is being done. To talk informally to management and labor in our plants, large and small and to go back to Washington and their job of law making with a clearer concpetion of what makes the wheels go 'round. Maybe people such as yourselves can initiate such visits.

Powerful pressures are pushing us in the direction of State ownership and hence of State Socialism. Few of us want it but even fewer are aware of these trends or are organizing to defeat them. This battle for freedom in our post-war world cannot be won on the principle of passive resistance. It will require brains, guts and persistance similar to that which our fighting boys are showing abroad.

By Wm. F. Klemm

A New Evaluation of Surface Finishes

Width, not depth, of interruptions determines the wear resistance of surfaces

HEAT TREATMENT and finishing are of prime importance in present day production, for the most economical processing of metals, close control of foundry practice and metallurgy in general, as well as subsequent machining operations. All of these factors, however, lose a considerable amount of their effectiveness if load bearing surfaces are not highly refined. It is well, then, to analyze the problems which present themselves in wear surfaces.

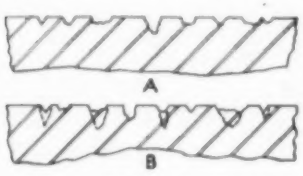


FIG. 1. Width of surface, between interruptions, not the depth of interruptions, determines the bearing efficiency of a surface.

Now, it is axiomitic that a highly finished surface, on a rotating or sliding member, offers less friction and is therefore subject to less wear than one coarsely finished. The reason is obvious—a highly refined surface has fewer interruptions per unit area. It should also be obvious that the life of a bearing or wear surface is proportional to the amount of interrupted surface lying in the plane of motion.

Wm. F. Klemm, **research and development engineer, has devoted a number of years to the design and manufacture of precision instruments, carbide tools, Diesel injectors, Swiss type screw machines and high speed grinding spindles. He is a member of Detroit Chapter, A.S.T.E.**

If 50 per cent of a surface, designed for a given load—Fig. 1, A—is lost due to crevices caused by wrong finishing methods, the remaining surface may be overloaded by 100 per cent. The depth of these interruptions (as shown at B, Fig. 1) is immaterial from a wear standpoint; the important consideration is the *width* between interruptions.

Unfortunately, most of our surface inspection methods emphasize the *depth* of finish marks and do not reveal the amount of surface lost because of these interruptions. This led to entirely new approaches:—first, in the inspection of finished surfaces, then, in their preparing and processing, and finally, in their application.

Taking these in order, it is important to consider that inspection instruments really belong in the shop, where the work is done, rather than in the laboratory or inspection department where, in the event of rejection, final checking is analogous to locking the barn door after the horse is stolen. Therefore, the first approach to the problem of surface finish was to design an instrument that, in addition to being simple to manipulate, would enable the production worker to check work in process as well as the highly trained specialist to check it in final inspection.

The simple optical principle involved is shown in Fig. 2. A light, striking a perfect surface (such as a mirror) at angle A, will be reflected at angle B. No light will strike the eye of an observer standing at O.

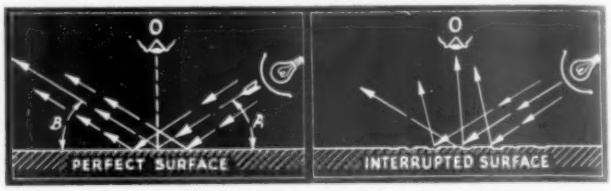


FIG. 2. *FIG. 3.*

If, however, there are interruptions and crevices in the surface (Fig. 3) these will form minute prismatic surfaces throwing light bundles into the observer's eyes. The oblique illumination, as shown, causes these interruptions to appear as silvery white lines on a darker background. The rougher the surface under examination, the brighter it will appear in the eyepiece of the instrument. Inversely, it will appear dark in direct ratio to the refinement of surface.

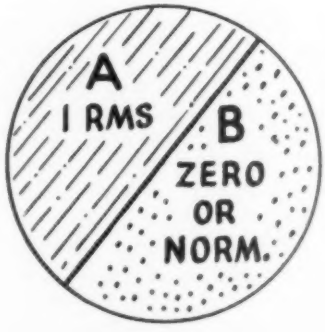


FIG. 4.

How "open" a surface of 1 microinch can be, is graphically illustrated in Fig. 4. Surface A implies a roughness, established by present day methods, of 1 microinch, while surface B—used as a standard of comparison—has "zero" finish—i.e., it is either a mirror finish or a surface established as a norm. Of this, more later. For immediate purpose of comparison, however, there is implied a difference of 1 rms between the surfaces, and it should be apparent to even the most casual observer that the two surfaces are entirely different.

The bright surface represents a part under inspection; the dark surface, the standard used for comparison. In this connection, it is not to be inferred that the standard of comparison need have "zero" finish—i.e., a surface refined to its ultimate. Rather, a part or norm may be used which represents the finish desired or demanded in a production run, and if the parts in production compare favorably, they may be deemed acceptable. In this connection, it would hardly be consistent to expect the same degree of finish in a heavy press crankshaft that one would demand for the shaft of a highly refined aircraft engine. The point is that the operator has the same simple means of comparison as the inspector, hence, can control quality of finish at the source.

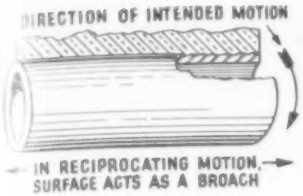


FIG. 5.

Fig. 5 shows a cylindrical body—such as a wrist pin—finished by grinding. When assembled in a bearing, and rotating, the circularly finished grooves, microscopic though they be, will reproduce their counterpart in the softer bearing metal. This will be the major change taking place in the inner surface of the bearing. If, however, this cylindrical body were required to make a reciprocating motion—such as tappets, plungers, cam followers, etc.—it would act as a broach and gradually shave away the bearing surface. Either way, then, the surface described tends to cut its mating part. Therefore, it is an entirely reasonable assumption that the finish an all wear surfaces should be a *directional finish*—i.e., in the direction of the intended motion of the part. It is obviously wrong to finish pistons in the same manner as crankshaft bearings, yet, as shown above, even a directional finish may cut into its mating part.

Zero Finish—Ultimate in Refinement

Having established means for visual comparison of surfaces, the next step was to evolve a surface finish which, refined far beyond previous standards, has been termed "zero" finish. The process involved will not be discussed here; sufficient to say that it is comparatively free from interruptions and closely approximates a mirror finish. The important consideration is its application, not only as a standard of comparison for surface finishes, but as a means of reducing wear in moving parts.

In this connection, if one were to rub two absolutely flat surfaces together—Fig. 6—even without an intervening film of oil, there would be no wear nor any scoring except as molecular cohesion might weld the parts together. One may even run a shaft, polished to a mirror finish, and without oil, in a bearing having equal finish, at sustained high speeds without appreciable heating or wear. (In fact, heat—which is caused by friction—is indicative of wear).

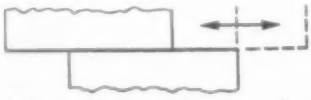


FIG. 6. No wear can occur between two absolutely flat surfaces rubbed together.

If, however, one were to use oil, allowing reasonable clearance for the film, the mating parts would wear indefinitely, maintaining a fit between the parts far beyond present day expectations of surface life.

Expanding on the matter of finish, Fig. 7 shows a surface of 3 microinches (top) compared to an established norm. As viewed through the eyepiece of the instrument, the upper portion shows the interruptions as bright lines, whereas the norm appears comparatively darker or black, depending on the degree of finish. When both surfaces appear alike through the eyepiece, they will be alike in fact.

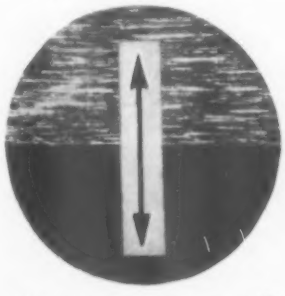


FIG. 7. Movement at right angles to finish will score mating part.

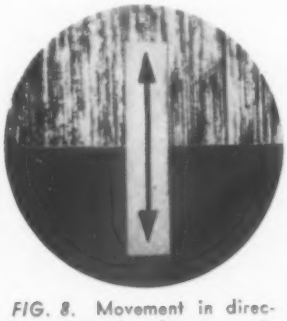


FIG. 8. Movement in direction of finish reduces wear in mating parts.

Fig. 8 shows two surfaces, the top with interruptions of 5 microinches, the lower a norm as in Fig. 7. Note, however, that the direction of movement in Fig. 7 is crosswise to the interruptions, whereas in Fig. 8 movement is in direction of finish. The one will cut a bearing, circumferentially, whereas the other will produce longitudinal scores. For reciprocating motion, the second is more nearly correct, yet it is only a palliative. A condition comparable to the application—or misapplication—in Fig. 7 holds for the valve tappet lifter, Fig. 9, since grind is at right angles to movement. This would cause wear in the guides. Similarly, the surface of the cylindrically ground wrist pin—Fig. 10—may be compared to Fig. 8. Movement is correct, being in direction of finish, yet there would be a tendency to groove the bearing.

FIG. 9. Tappet lifter for aircraft engine. Cylindrical grinding at right angles to movement causes wear in guides.

FIG. 10. Cylindrically ground wrist pin. Motion in direction of grind—application correct.

Unidirectional Finish

On the other hand, a *unidirectional finish*, as shown in Fig. 11, would cause no appreciable wear on mating parts despite the fact that the depth of interruptions may be as deep or deeper than those on the surfaces of Figs. 7, 8, 9 and 10. This surface may be applied universally, or circular or reciprocating motion, without danger of scoring or wearing its mating part. As a result, life would be indefinitely extended.

FIG. 11. Unidirectional finish. No appreciable wear on mating parts regardless of direction of motion.

FIG. 12. Top: Typical gage block, finished to 1 microinch. Bottom: Gage block with zero finish.

Coming back to "zero" finish, Fig. 12 shows a typical commercial gage block (top) finished to modern standards of surface finish. The depth of interruptions is about 1 microinch. Yet the "zero" surface (bottom) appears dead black by comparison, proof of its more highly refined finish. For, as previously stated, where there are no interruptions to catch the light waves, this surface will appear dead black.

Why Round Surfaces Appear Flat

In case the reader is curious to know how round parts, under inspection, appear as apparently flat surfaces through the eyepiece of the instrument, the ex-

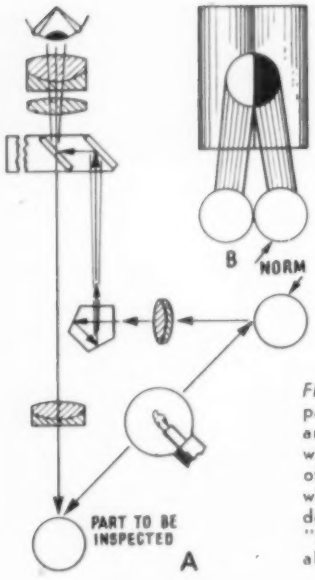


FIG. 13. Diagram "A" shows path of light to and from norm and test piece to eye of observer who sees only the central portion of each object. Both converge when viewed, with sharply defined demarcation between each (as at "B"). If, however, surface are alike, then both will appear alike.

planation is quite simple. The instrument is a dual microscope in which a sample or standard of the desired finish is held in the master stage below the handle of the instrument.

To inspect a surface under question, it is only necessary to position and clamp the master, then to place the instrument on top of the surface to be inspected, and to swich on the lamp. Both surfaces will then appear side by side in the eyepiece, but highly magnified, as schematically illustrated in Fig. 13, A and B. A perfect surface will appear absolutely black—no scratch or interruptions visible. If the two surfaces compare in finish, both will appear alike. As the quality of finish coarsens, the interruptions in the surface appear broader and deeper, and the increased reflections from the finish marks cause the surface to appear brighter. In this manner, parts are tested by comparing them against an accepted standard.

As for the standards used, these may be to any degree of surface refinement, from ordinary grinding finishes to a high polish, the main thing being that they serve as a norm for the particular part being processed.

Summed up, then, the whole involves the evolution of a surface finish which presumes a minimum of wear between mating parts, its proper application, and means of quickly comparing such finishes for control of surface quality during production. It is believed that this triple objective has been achieved.

By G. F. Gerhauser

Lightweight Indexing Fixture For Automatic Riveting

Standardized fixtures broaden work range of automatic, single purpose production machines

TOOLING PROCEDURES have been simplified and production efficiency has been increased at Consolidated Vultee Aircraft Corporation, San Diego, California, by means of light-weight indexing fixtures which make it possible to utilize Erco automatic riveters for an unprecedented variety of airplane assembly operations.

The fixtures are fabricated simply by trimming, drilling, slotting, and stiffening aluminum alloy sheet on which master layouts have been reproduced for reference purposes. They do not necessitate individual tool designs, and their construction is such that they can be handled with maximum speed and ease by even the most inexperienced machine operator.

G. F. Gerhauser **is a native of St. Louis, where he attended the University and served apprenticeship, as tool and die maker, with the St. Louis Screw Co. Rounding out his practical training with the Yellow Sleeve Valve Engine Wks., the Rock Island Arsenal and International Harvester, he connected with Consolidated Vultee in '35, and early in '45 was promoted to Chief Tool Engineer at the San Diego Division of the company.**

Erco machines were not previously used with optimum efficiency, because it was considered necessary to have separate tools for drilling and riveting interchangeable parts. Besides requiring much unnecessary tool designing, this involved an excessive use of manpower on the production lines; and, consequently, there was a tendency to seek other methods of assembly.

The Erco indexing fixtures do not have to be designed separately because their construction is standardized, and because they are produced directly from master layouts. Further, they eliminate the need for drill jigs by making it possible for riveting machines to punch holes which are both accurate and coordinated.

This essentially reduces the work of the tool engineer to a simple matter of suggesting changes whereby original engineering designs can be altered so as to permit the use of the indexing fixtures, because all remaining operations can be accomplished directly by a specially-trained group of tool fabricators.

The sheet upon which the master layouts are reproduced is 24-ST Dural with a thickness of $\frac{1}{8}$", and the sequence of operations necessary to make tools from such reproductions is as follows:

(1) The tool is "planned" by the toolmaker at his workbench. The planning consists of studying the layout reproduction and deciding on the best means of installing clamps, stops, bridges, etc.

(2) The layout reproduction or template is cut to the correct length and width.

(3) The line layouts for slots are extended by scribing, so that the lines can be checked after the slots are cut in Operation No. 9. This is necessary because the heat of the cutting tool will probably eradicate all of the original layout lines in its immediate vicinity.

(4) Filler strips are positioned and riveted to the template. Drilling, counterboring, and countersinking are accomplished whenever necessary as part of this operation.

(5) All rivet locations marked on the template are center punched.

(6) The rivet pattern is drilled with a tool whose size is the same as that of the pilot in the counterbore which will be used in the next operation.

(7) The rivet pattern holes are counterbored, so that the dimensions of the drilled holes will be .004" larger than the diameter of the Erco stripper.

(8) The rivet pattern holes are countersunk approximately $\frac{3}{64}$" deep, so that the Erco stripper can be readily fitted therein.

(9) Slots for the standing legs of angles are cut in the template.

With reference to the lines scribed in Operation No. [illegible] slots are filed to the correct dimensions.

Drill bushings are installed in all tooling holes.

Drill bushings are installed for the drilling of holes [illegible] the overall total material thickness of overlapping parts [illegible] exceeds limitations of the Erco machine.

Stiffening angles are attached to the template.

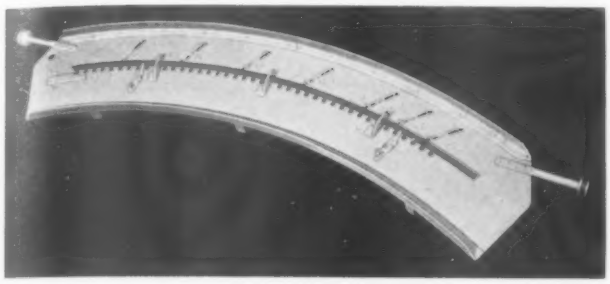
Stops are made, fitted, and installed on the template.

Bridges are made, fitted, and installed on the template.

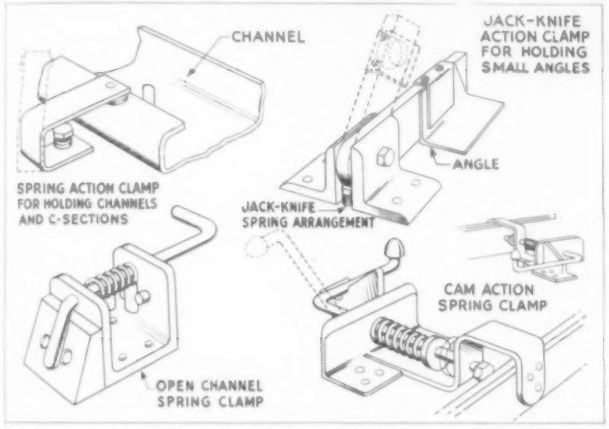
Clamps are made, fitted and installed on the template.

Legs are installed as necessary.

Two handling arms are installed so that the tool will be perfectly balanced when loaded.



A typical Erco indexing fixture. Made from 1/8" Dural steel, it is perfectly balanced, on its handling arms, when loaded and attached to the handling fixture of an Erco Riveter.



Typical examples of standardized clamps currently used in connection with Erco indexing fixtures at Consolidated Vultee Aircraft Corporation.

When the tool has been fabricated and loaded, its handling arms are attached to spring-balanced handling fixtures which project from the sides of the Erco machine. Then it is necessary only for the operator to guide the tool and control the machine operations. A mirror, attached to the machine and focused on the bottom side of the fixture, enables the operator to guide the fixture so that the proper holes therein can be quickly and easily positioned over the stripper.

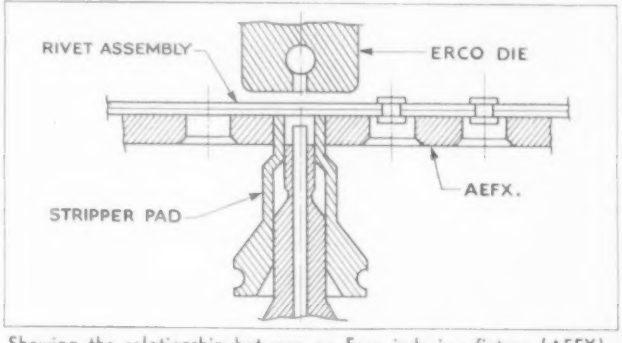
In designing parts which are to be assembled by means of Erco machines and indexing fixtures, it is particularly important to make sure that the parts thicknesses do not conflict with the dimensional limitations of the riveters.

All extrusions, stiffeners, etc., should be on the same side of the web; and, when stiffeners are used parallel to wing rib flanges, they should be on the side opposite to the web so that it will not be necessary to weaken the indexing fixture by cutting parallel slots.

Unless a special Erco die is used, rivets should not be placed close to a bend radius; and closed flanges should be generally avoided in order to prevent interference with the die and stripper pad.

The spacing of rivets should be such that the Erco die will not interfere with an adjacent rivet in the course of any individual operation, and so that there will be no overlapping of hole patterns in the indexing fixture. If possible, all of the rivets in a subassembly should be of the same size because this will eliminate the necessity of changing the machine setups.

An Erco Riveter, with indexing fixture attached to spring balanced handling fixture. A mirror, attached to the machine and focused on the bottom side of the fixture, enables the operator to guide the fixture so that the proper holes can be quickly and easily positioned over the stripper.



Showing the relationship between an Erco indexing fixture (AEFX), the parts to be riveted, and Erco stripper-die units during the process of automatic riveting.

Caution should be exercised in selecting and using extrusions or similar formed shapes. Angles with narrow legs, "C" channels, and bulb angles should be avoided. "Z" sections should be used whenever possible. When hat sections are necessary, it is best to choose those with flat contact planes.

Erco riveters are now being used as extensively as possible at Consolidated Vultee because cost and time studies have revealed that, with indexing fixtures, they have the following advantages:

(1) They save at least 50 per cent of the tooling costs necessitated by other methods of riveting.

(2) They shorten the tooling interval by approximately 80 per cent.

(3) They save at least 50 per cent of the production time necessitated by other assembly methods.

(4) They save virtually all production rework time.

(5) They produce consistently uniform assemblies.

By Wm. M. Flashenberg

Metallizing—Modern Production Tool

Many metals can be "spray-coated" to provide hard surface or to reclaim worn or undersize parts

METAL SPRAYING—or "Metallizing," to use a trade name—is a comparatively new process that had its inception about 30 years ago. At first, it was mainly applied as a corrosion resistant coating, more or less as galvanizing protects ferrous metals against the elements.

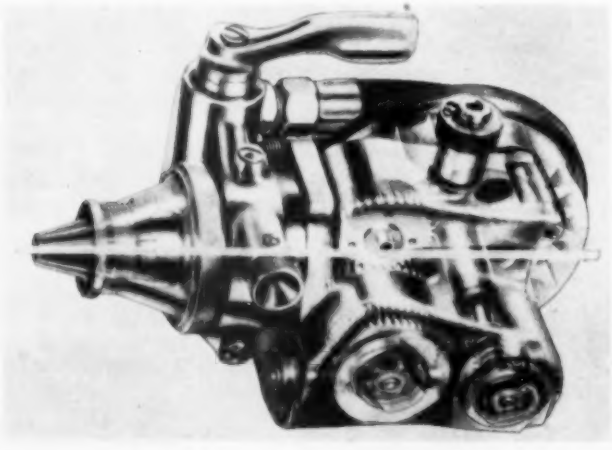
Like many other modern innovations, its development, and acceptance by industry, was rather slow. While used to a considerable extent in Germany during the first world war, it did not begin to find favor in the States until around 1930. From then on, however, its use has expanded into almost every industry, both in maintenance and production. In fact, it has become one of the most versatile processes in industry.

Largely, this wide application has been due to intensive surveys to determine industrial needs, and later development to meet these needs. This development has not only included means to improve the process and the quality of sprayed metal, but to improve tools and equipment as well. As a result of this research and development, practices and procedures of metal spraying have been reduced to a practical science, while costs have been reduced in direct ratio to improvement. By now, metal spraying is practically automatic.

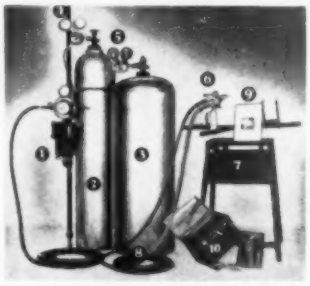
A native of Detroit, *Wm. M. Flashenberg* received his B.A. and M.A. degrees at Wayne University, where he later taught history. He also took post graduate work and taught at the University of Illinois. A member of Detroit Chapter, A.S.T.E., he is owner of Flash Tool & Engineering Co., and of the Industrial Metallizing Co., Detroit.

While simple in its overall application, the technique of metal spraying involves three essential phases—preparation of the surface, application of the metallic coating and, where necessary, finishing of the sprayed surface. Taking these in the order mentioned, it is absolutely essential that the surface to be sprayed—and this applies equally to metallic or non-metallic materials—be thoroughly clean before the coating is applied. All traces of grease must be removed, and the surface roughened to insure a homogeneous bond.

Phantom View of Metallizing "Gun"



While various preparatory methods are employed, only four have been found to be entirely practical. Large flat or irregular surfaces may be either grit or sand blasted, using a sharp abrasive only. On shafts and cylindrical members, best results are obtained by rough turning—with feed comparable to threading—or by grit or sand blasting as in the case of flat surfaces. Either way, the surface must be roughened to produce innumerable pores or crevices into which the sprayed metal may lock itself securely. Naturally porous surfaces, such as cement, plaster and wood, need only be free from oil, paint, lacquer or sealer. For hardened and heat treated surfaces an electric bonding method, such as the one known as the Mogul Electric Bonding Method and developed by the Metallizing Company of America, has been proven positive and extremely satisfactory.



Complete Equipment for Metal Spraying

Easily Applied by Spray "Gun"

Once the surfaces are prepared and clean, the next step is to apply metal by means of a spraying tool, popularly termed a "gun" and analogous to the spray guns ordinarily used for paint spraying. This tool, which is a lightweight device, combines power and combustion units. (See phantom illustration). The power unit consists of an aluminum housing which contains a high speed air turbine, the latter attached to a gear reduction and running in a bath of fluid grease. The reduction gearing, in turn, is connected to feed rolls which feed the wire or rod through the gun during the spraying.

The combustion unit, which is bronze, includes the gas head, simultaneous control valve, wire nozzle, air cap and the turbine regulating screw which controls the wire or rod as it passes through the nozzle.

In operation, the wire is fed through the power unit at a uniform rate and on through to the combustion unit and into the apex of an oxy-acetylene or oxy-propane flame cone, where it becomes instantly reduced to a molten state. The melted metal is atomized by a concentric air blast which drives it, at high velocity, against the surface to be coated.

Then, as the particles of molten metal impinge on the surface, they are driven and locked into any crevices or pores which may be in the line of flight. Thereby is created a strong, cohesive initial bond which, since metal spraying is a continuous process, may subsequently be built up to any desired thickness.

The final stage in the process is finishing, this depending entirely on the purpose for which the coating is applied. If

ed as a protective coating, no further finishing may be red. If, however, the object is decorative, the surface be ground, polished or chemically treated for color. In bine elements, method of finish—i.e., whether by cutting grinding—will depend entirely on the nature of the metal yed. Softer metals may be tooled, whereas hard, high bon surfaces will likely as not have to be ground.

One of the advantages of metal spraying is that there is no danger of warpage or distortion from heat. Neither is there any particular size limit of the object to be treated.

Metallizing a Large Revolving Piece

Entirely aside from its use on the production line, however, metallizing is patly applicable to the maintenance and rebuilding of equipment. There, it saves time, material and replacement costs. In addition to being applied for the purpose of protection against corrosion or chemical reaction, it restores the performance standards of worn shafts, bearings, cylinders, spindles and unnumbered other machine parts. In manufacturing operations, it may be used to reclaim parts that, ordinarily, would be scrapped due to faulty machining.

Build-up can be closely controlled to permit finish grinding without intermediate machining.

It is therefore entirely practical, and often highly desirable, to spray a harder metal onto the ways of lathes and other wear surfaces, for increased durability and life. When so applied, the ordinary fine finish may be dispensed with; instead, the surfaces may have a coarse finish, for subsequent bonding, although they must be held true for machine alignment. The hard surface may then be finish ground.

Almost any metal, ferrous or non-ferrous, may be sprayed provided it may be procured in wire form. Among these are aluminum, brass, bronze, copper, zinc, lead or tin, as well as low and high carbon and stainless steels. Not only may parts be reclaimed with the original metal from which they are made, but they may be coated with other harder metals, thereby increasing life severalfold. Furthermore, because of the absence of heat, and the fine control of the metallizing gun, metal can be sprayed on wood, glass, paper, cloth, leather and concrete. Even concrete, brick or frame buildings may be metal coated, thereby presenting an enduring surface to the elements.

In aviation, aluminum has been sprayed on parts exposed to corrosion, such as manifolds. Foundries have utilized metal spraying for filling in defects in castings without warpage, and without the cracking resulting from preheating. Wood patterns and molds are protected from nicking and warpage by spraying with aluminum or bronze after preparation. Mills and refineries have built up cylinders and journals that were worn on the bearing surfaces, and pump rods and plungers have been sprayed as protection against corrosion, and have been reclaimed. Turbine and armature shafts have been reclaimed in power departments, while turbine runners—which suffered from cavitation—have been repaired most economically by this process.

Harder Surface for Longer Wear

In practically all cases a metallized shaft will wear considerably longer than the original, due to the increased wearability obtained by applying a harder surface metal. Sprayed metal, being porous, also absorbs a great deal of lubricant, further reducing wear on both bearing and journal. When metallizing, the base shaft being sprayed will not reach a temperature exceeding 180 degrees F.

Spraying Non-Corrosive Coating on Dairy Equipment.

Questions may arise regarding advantages of metallizing over other contemporary methods of surface coating and reclamation. In production coating, as in galvanizing, it has certain definite advantages over electro-plating and hot dip, in that base metal and coating need not have affinity for one another. Nor does one need to install tanks and expensive plating equipment which takes up considerable floor space.

Unlike welding, it is not a repair process for joining broken parts. However, it may be claimed to be superior to welding as a means of building up worn surfaces—such as journal bearings or working surfaces of shafts—due to the fact that it does not warp or crystallize the part. Therefore, it eliminates straightening after build-up, and also greatly reduces danger of breakage.

Production or Reclamation

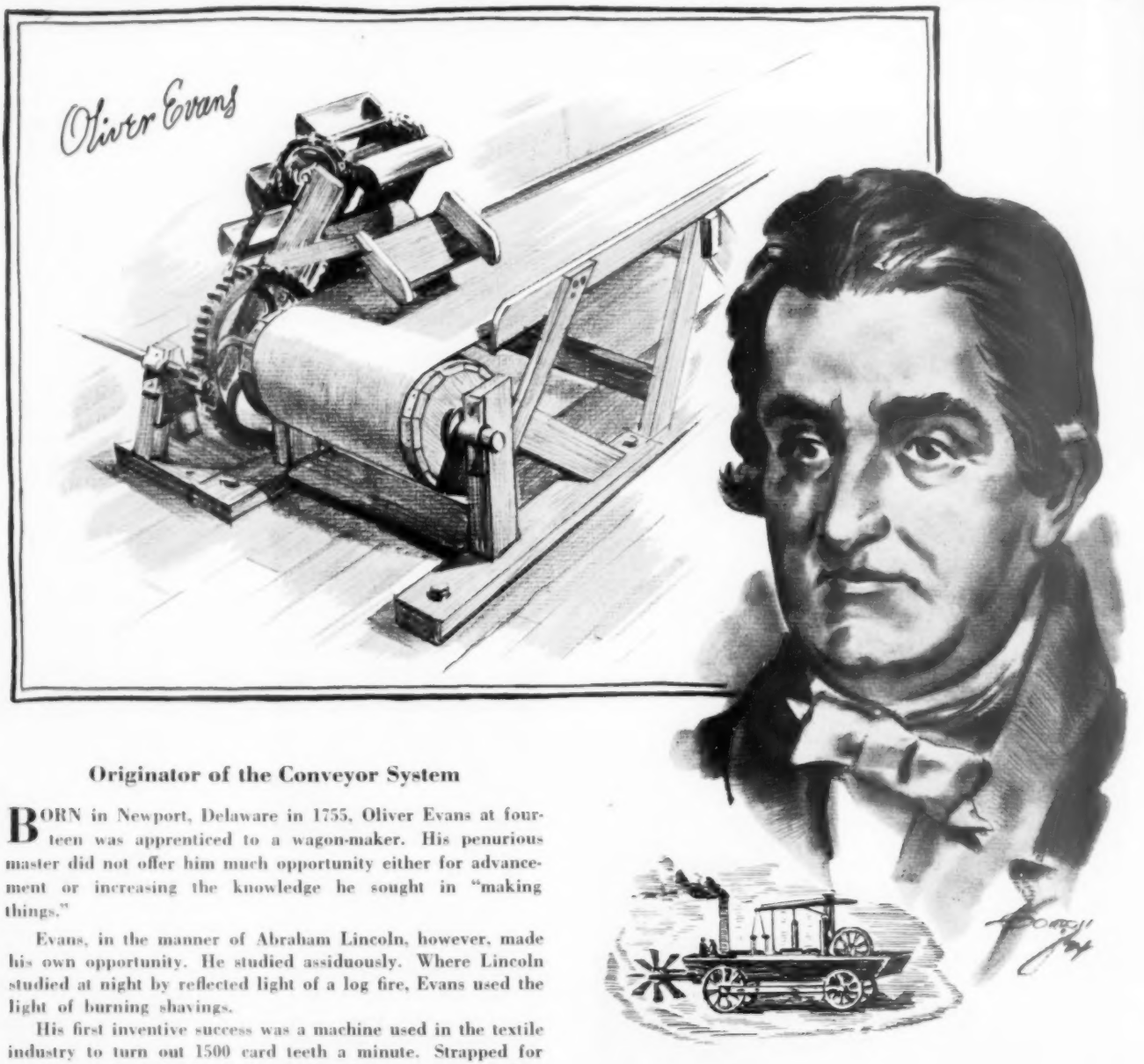
With proper attention to preparation of surfaces to be sprayed, and with time and care to ascertain the proper applications, there is little doubt as to the efficacy of this process, whether for production or reclamation. And, while the equipment is available for plants, to be used in their production or maintenance departments, as the case may be, metallizing may also be "farmed out," just as one may send out welding or plating to specialists.

Either way, the process offers advantages. The plant having the equipment can metallize "on the spot"; on the other hand, the jobbing shop which specializes in the process has the advantage of constant study of diversified problems, and this experience is accumulated for future jobs.

Photos by courtesy of Metallizing Co. of America.

Pioneers of Mass Production

Number Three of a Series



Originator of the Conveyor System

BORN in Newport, Delaware in 1755, Oliver Evans at fourteen was apprenticed to a wagon-maker. His penurious master did not offer him much opportunity either for advancement or increasing the knowledge he sought in "making things."

Evans, in the manner of Abraham Lincoln, however, made his own opportunity. He studied assiduously. Where Lincoln studied at night by reflected light of a log fire, Evans used the light of burning shavings.

His first inventive success was a machine used in the textile industry to turn out 1500 card teeth a minute. Strapped for funds, he asked the Pennsylvania Legislature to provide him money to properly introduce the machine, which combined three manufacturing operations in one, and which established a new industrial tradition in America.

He was turned down, but by 1788 others began to make cards by his method. He got neither financial reward nor recognition for this work.

Later, Evans designed a flour mill. It was simply an elaboration of the card making pattern. Evans' flour mill took the grain as it was delivered to the mill, weighed it, hoisted it into the hoppers to proceed through various processes, which, in a single continual operation, changed the grain into flour. Some historians cite Evans' flour mill as the first example of an uninterrupted process for mechanical manufacture.

Evans also turned his inventive genius to creating a horseless carriage, which actually worked. Also, there is a belief that he invented the opposed cone variable speed pulley, forerunner of modern variable speed transmissions.

From the modern manufacturing standpoint, however, Evans' strongest claim to fame in industry is the fathering of materials handling systems. In 1783, and again in 1807, he wrote comprehensively on the use of various conveyors in manufacturing processes—bucket elevators, chain and drag conveyors, screw or helical conveyors—in fact, virtually every type of conveyor used by industry today was advanced by Evans. Modern industry has departed little from the Evans originals.

History is often unkind to truly great men. It has been so particularly in Oliver Evans' case. Single-handedly he invented and produced many basic machines and systems for which others took not only the credit, but also most of the financial rewards accompanying them. Some future historian may well tell the entire story of Oliver Evans and place him where he belongs, in a niche alongside Eli Whitney and other inventors of Colonial America.

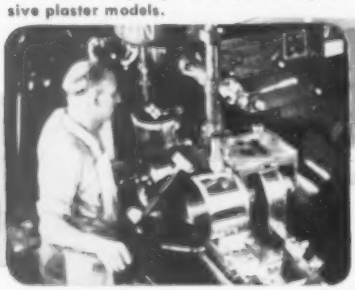
See this New 30-Minute Movie and Save Months of Postwar Planning

This new Gorton Sound Motion Picture, in colors—"An Exact Duplicate"—shows latest techniques on many jobs like those you'll tackle after "V-E Day."

Yes, the 30 minutes that you'll spend seeing "An Exact Duplicate" may give you the practical solution to that tough postwar production problem that is on your drawing board today. This motion picture, filmed in color and sound under actual machine shop conditions, shows Gorton Tracer-Controlled Machines *in use* on plastic die and mold jobs, forging dies, high production profiling, milling, 2 and 3 dimensional engraving and manual and electric duplicating.

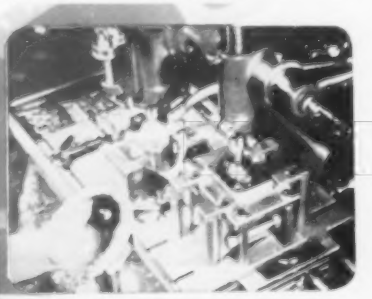
Available now without charge—for showing to technical societies, company groups, conventions, training schools, and other organizations. Write us today for further information, giving choice of three tentative dates.

(Above) Complex irregular shapes and contours are easily duplicated from inexpensive plaster models.



(Above) Flexibility of Duplicator Control solves many industrial problems.

(Above) A revolutionary idea in grinding.



(Above) It is simple to do production profiling of parts which must be held to close tolerances.

GEORGE GORTON MACHINE CO.

2606 RACINE STREET, RACINE, WISCONSIN, U.S.A.

Aristocrats of Die Steels

LEHIGH S · LEHIGH H · LEHIGH L

Here are three blue-ribbon die steels that have several things in common: *top production, high abrasion-resistance, and an absolute minimum of distortion and dimensional change under heat-treatment.* All are members of the high-carbon, high-chromium group, yet each has its own characteristics, each its separate uses. Briefly, these are as follows:

Grade	LEHIGH S	LEHIGH H	LEHIGH L
Type	Oil-hardening	Air-hardening	Oil- or air-hardening
Abrasion-Resistance	1*	2*	3*
Shock-Resistance	3*	2*	1*
Primary Alloying Elements	C 2.05 Cr 12.00 V 0.60	C 1.65 Cr 11.50 V 0.40 Mo 0.80	C 0.85 Cr 11.50 V 0.30 Mo 0.45 Ni 1.00
Typical Uses	Blanking, punching, forming, and thread-rolling dies; lamination dies for high-silicon sheets; shear blades and rotary slitters for thin-gage material (pickled or cold-rolled).	Blanking, punching, and forming dies; master tools and hobs; mandrels, gages, taps; bending or forming rolls.	Punching, forming, and trimmer dies; flying shear blades for continuous sheet and strip mills (sheets, bright and unpickled or unscaled; plates up to ½ in. thickness); thread-rolling dies.

*1—*Highest of group.* *2—*Medium.* *3—*Lowest of group.*

These three steels are aristocrats of the tool room; yet none of the three is a "fussy" steel, none is hard to handle. Once you've stocked and used them, they'll always have a place in your inventory. Ask your Bethlehem distributor for further details.

★ BETHLEHEM STEEL ★

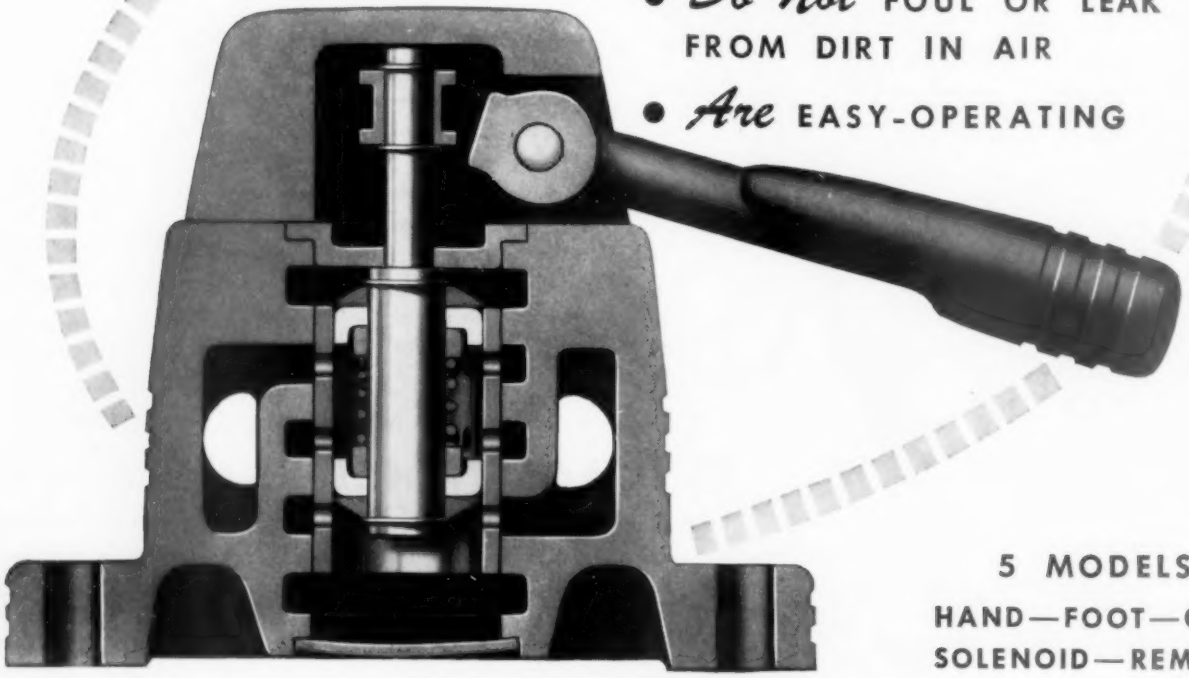
Bethlehem Steel Company, Bethlehem, Pa. • Bethlehem Steel Export Corporation, New York City

Yes, it's true!

GEROTOR *Air* VALVES *have*

Model 2100
Air Control Valve

- CUP-PACKING SEALS
- *Are* SELF-SEALING
- *Are* SELF-CLEANING
- *Do Not* FOUL OR LEAK FROM DIRT IN AIR
- *Are* EASY-OPERATING



Cross Section
View of Model 2100

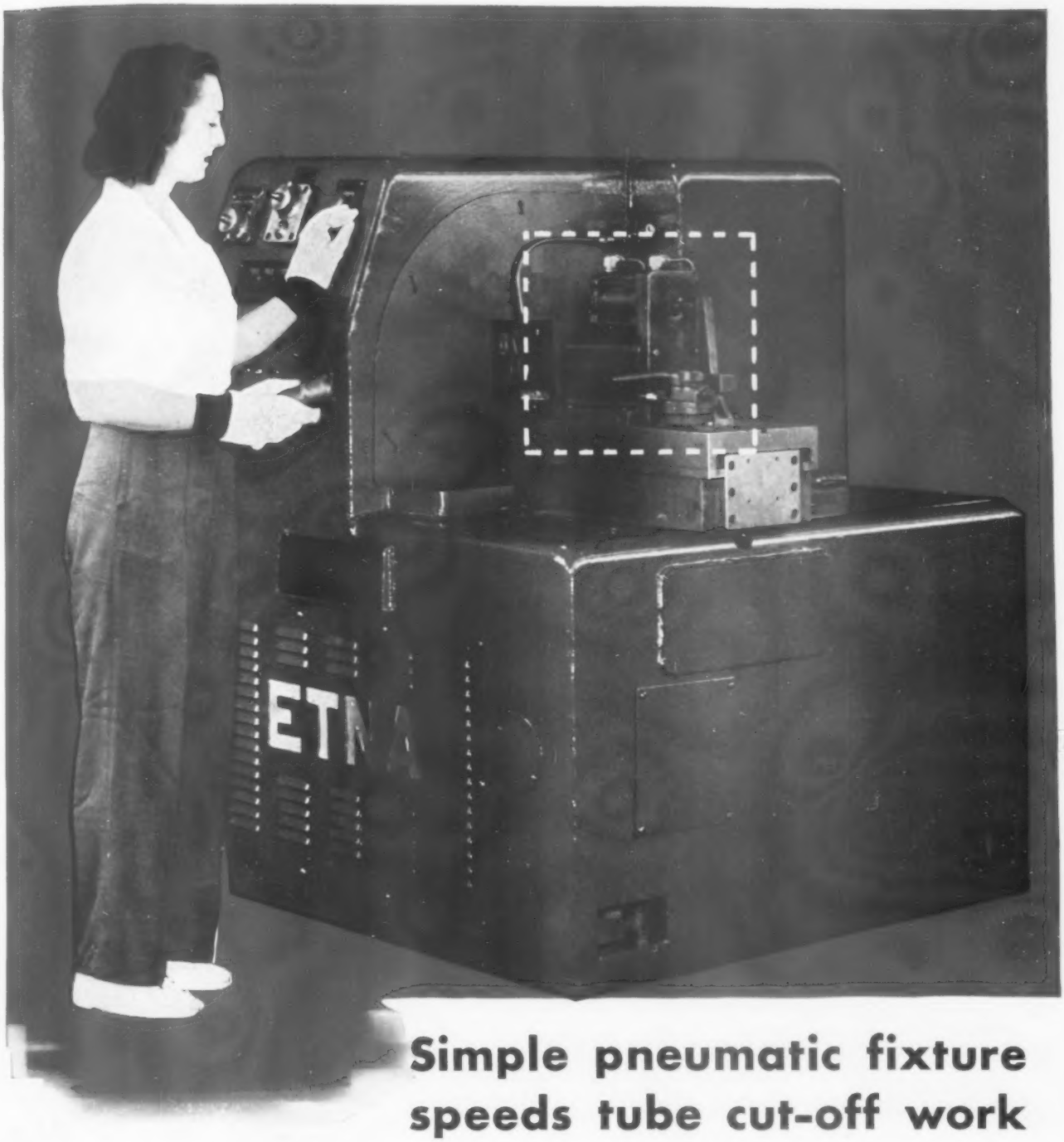
5 MODELS
HAND—FOOT—CAM
SOLENOID—REMOTE

5 SIZES
¼" - ⅜" - ½" - ¾" - 1"

GEROTOR
AIR AND HYDRAULIC DEVICES

LOGANSPORT, INDIANA

GEROTOR MAY CORPORATION • PLANTS—BALTIMORE, MARYLAND • LOGANSPORT, INDIANA



Simple pneumatic fixture speeds tube cut-off work

This Etna tube cut-off machine is a self-contained unit with a push-button controlled automatic cycle. The work is held stationary and the cutter head revolves. The work holding fixture shown here handles drawn shells which are trimmed to exact length from a shoulder. The Hannifin cylinder (with Hannifin Air Control Valve) operates a collet which grips the work, and the entire fixture moves forward to cut-off position.

Hannifin pneumatic cylinders provide the precision construction with bored and honed cylinder bodies that gets the most from air power. Smooth action, ample power, and simple control contribute to fast production and accurate work.

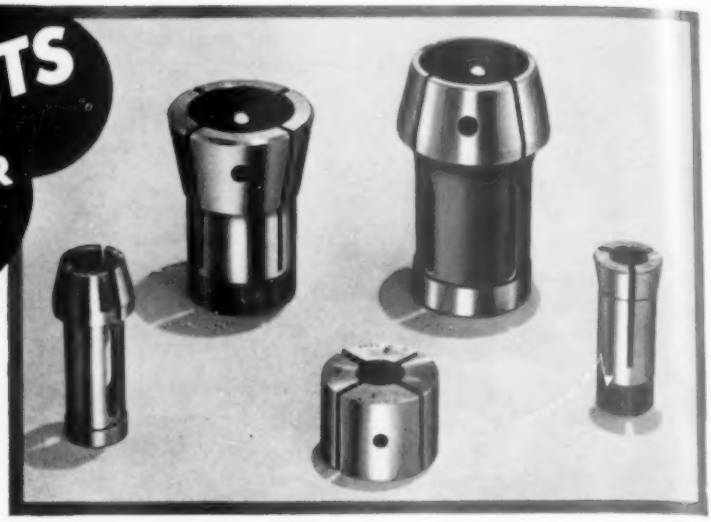
Write for cylinder and valve bulletin with complete data. Hannifin Manufacturing Company, 621-631 South Kolmar Avenue, Chicago 24, Illinois.

Hannifin

PNEUMATIC CYLINDERS

DO IT WITH *Zagar* COLLETS

EASIER • FASTER • BETTER AT LESS COST



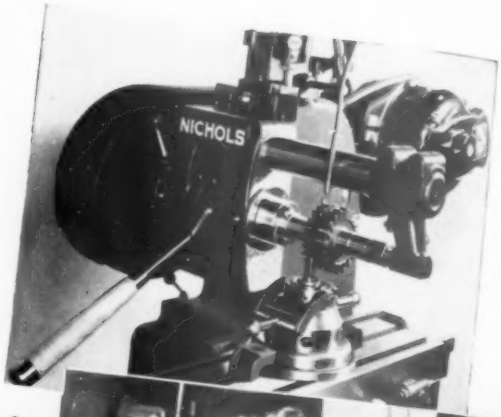
● Do it fast — do it right — with Zagar Collet Fixtures and Collets. Before you go in for expensive special fixtures, see what Zagars can do on milling, drilling, tapping, slotting, grinding and turning with collets—*without special tooling*. HIGHLIGHTS: holding or indexing with collets, horizontal or vertical position; air-operated or not, fully automatic or manual; load and unload while running; collet lathe chuck.

Get our complete Catalog T-6

ZAGAR TOOL, INC.

23890 Lakeland Boulevard : CLEVELAND 17, OHIO

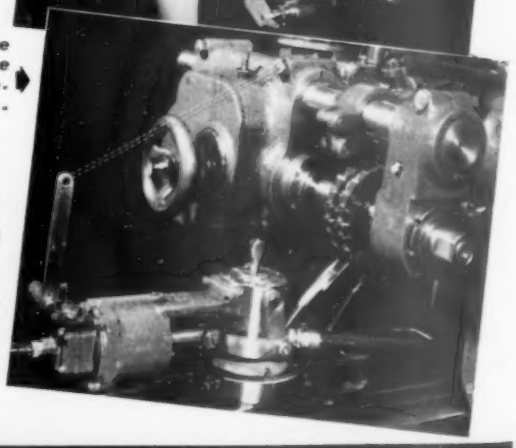
Zagar INDEXING AND HOLDING FIXTURES



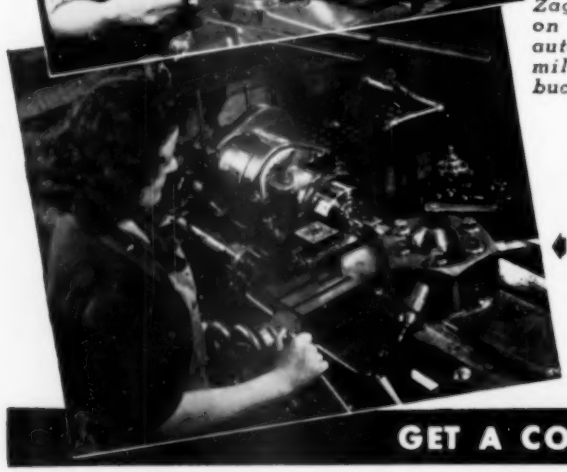
Milling squares on the Nichols Miller. Nichols has listed Zagar Index Fixtures as standard equipment; 1" size shown here.

2" Zagar Index Fixture on a U. S. hand mill, milling hexes on bolts

1" Zagar Lathe Chuck on 9" South Bend lathe, facing off bushings to .001" length tolerance



Zagar 1" Air-O Fixture on a Brown & Sharpe automatic mill, straddle-milling aircraft turnbuckles.



2" Zagar Collet Lathe Chuck on 16" South Bend turret lathe turning a job on which length dimensions and concentricity are all-important

GET A COPY OF OUR *GROWING* CATALOG

FRICTION SAWING

easy with DoALL Zephyr

Here it is—Friction Sawing, the modern way to cut hard, ferrous metals—to step up production as much as 7-fold.

The saw cuts with an action similar to that of "torch cutting" but there are no twisted, distorted shapes of thin materials—no jagged edges; in fact, on many jobs the finish is so smooth that further machining is unnecessary.

The Zephyr is safe. Equipped with automatic safety brake for instant work stoppage and the blade is fully enclosed in strong steel housing, except at work table.

Blade heat is dissipated by the specially-constructed, large-diameter wheels.

Best Way to Cut
STAINLESS STEEL
ALLOYS · TUBING
ARMOR PLATE
CAST STEEL · CAST IRON · ILLIUM

The DoALL Zephyr provides infinite variable speeds of 2,000 to 10,000 f.p.m. or 3,000 to 15,000 f.p.m. for cutting aluminum, magnesium, lead, zinc, brass, kirksite, copper, wood, masonite, rubber, plexiglass, plastics and laminates.

Send for copy of the new booklet FRICTION SAWING and other Zephyr performances.

Contour Sawing

Band Filer

Super Surface Grinders

Grinding Wheels

Magnetic Chucks and Selectron

Colloidal Cutting Oils

and Soluble Oils

Dust Collectors and Coolant Systems

Variable Speed Pulleys

SPEEDMASTER

Band Saws

Band Files

Inspection Laboratory GAGE BLOCKS with Instruments

DoALL

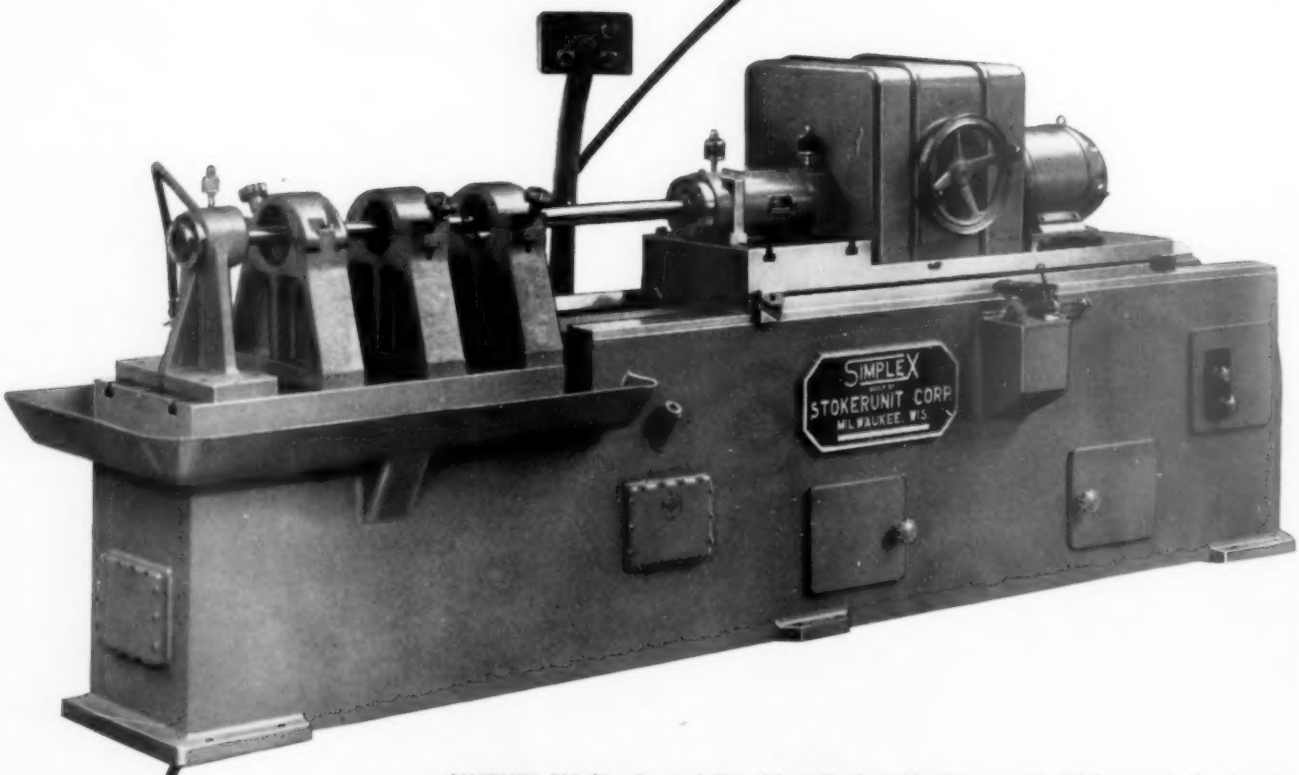
INDUSTRY'S NEW SET OF TOOLS

CONTINENTAL MACHINES, INC.
1309 S. Washington Ave. • Minneapolis 4, Minn.

Sales & Service Offices: Baltimore, Birmingham, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Dallas, Dayton, Denver, Detroit, El Paso, Erie, Grand Rapids, Hartford, Houston, Indianapolis, Kansas City, Los Angeles, Milwaukee, Minneapolis, New York, Orlando, Philadelphia, Pittsburgh, Providence, Reading, Rochester, Rockford, St. Louis, San Francisco, Seattle, Statesville, Syracuse, Toledo, Tulsa.

SIMPLEX

Boring heat-treated alloy steel tubes for struts and actuating cylinders, rapidly and accurately, is one of the new mechanical problems developed by the war. The requirements are stringent, the material tough and hard.



SIMPLEX 2U Single-end Precision Boring Machine with 48" travel, for boring cylinders up to 23" boring length. A variable speed drive unit permits instant adjustment of cutter speed to suit the requirements of the tool and work. Hydraulic feed with all controls conveniently ranged on the front of the machine permits quick and accurate adjustment of feed rates. Rugged fixtures and well-supported boring bars insure that the accuracy of the machine is reproduced in the work. A large volume coolant system floods the work to keep down heat and wash out chips. If you are confronted with similar problems, let our engineers help you solve them with an application of the proper SIMPLEX Precision Boring Machine.

Precision Boring Machines

STOKERUNIT CORPORATION

SIMPLEX Precision Boring and Planer Type Milling Machines

4528 West Mitchell Street, Milwaukee 14, Wisconsin

NORBIDE*

Increases Gage Life 100 Times!

NORBIDE*--the hardest material made by man... resists abrasion and scratching... will not pick up lint nor become charged with metal particles... lighter than aluminum... outwears conventional measuring devices 100 times and more.

NORTON COMPANY
WORCESTER 6, MASSACHUSETTS

*Reg. Trade-mark

Here's Real Gage Block Service

WEBBER *Standard Gage Blocks... Heavy Duty Gage Blocks*

● In Webber Standard Gage Block Sets you get a wide working range with gage blocks made within 4 millionths of an inch accuracy. Webber Sets permit 250,000 measurements as compared to the average 125,000. This is made possible by the .10005 inch block included in all 84 and 43 block sets. Another advantage is the two wear blocks also included in these sets for use where blocks come into contact with the work. Dimensional accuracy – Stability – Surface Finish – Wearing Quality are inherent features of all Webber Gage Blocks.

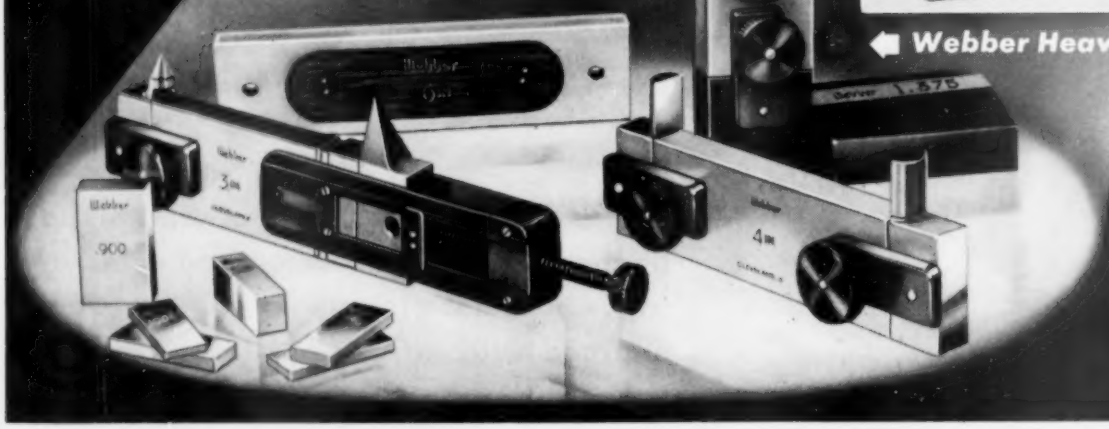
Webber Heavy Duty gage blocks are practical, accurate measuring tools which may be quickly assembled into a precision Height Gage—an inside or outside Caliper or Divider. These extra large gage blocks with generous wearing surfaces all with accuracies within millionths of an inch bring the tool maker new precision in layout and inspection work. Note all 6 inch heavy duty blocks have walnut insulation strips to keep heat of hands from the gage itself.

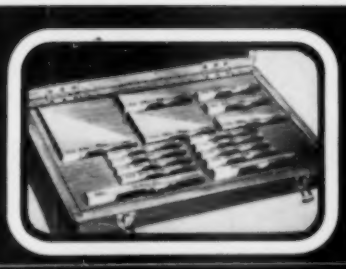
For a complete dependable gage block service use Webber Standard and Heavy Duty Gage Blocks.

Set No. 84A . . $350.00 **Set No. 43A . . $185.00**
Set No. 84B . . $235.00 **Set No. 43B . $150.00**
Set No. 38A (Thin Blocks) . . . $195.00
Set No. 38B (Thin Blocks) . . . $155.00
Set No. 14A (Angle Blocks) . $450.00
Set No. H. D. 24 . . . $385.00
Set No. H. D. 36 . . . $450.00

Webber Standard Gage Blocks

Webber Heavy Duty Gage Blocks

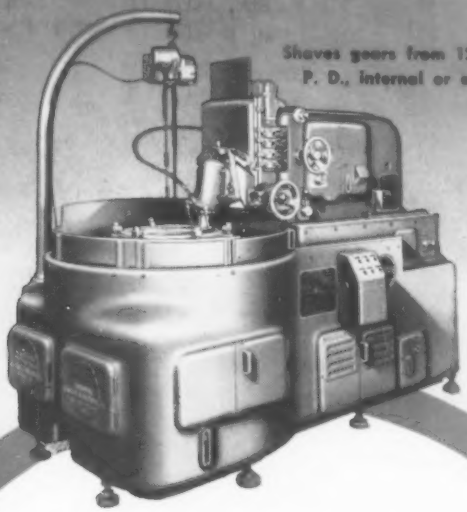




Webber GAGE COMPANY

12908 TRISKETT RD. • CLEVELAND 11, OHIO

Shaves gears from 3/16" to 4" P. D.



Shaves gears from 12" to 36" P. D., internal or external.

Shaves gears from 1" to 24" P. D.

MACHINES

NOW AVAILABLE

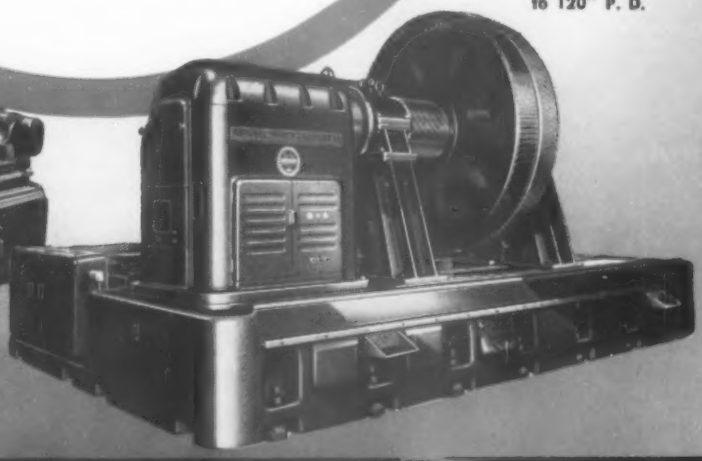
FOR SHAVING ALL GEARS

3/16" to 220" P.D.

A complete line of Red Ring machines is now available for shaving gears from 3/16" to 220". The teeth of gears from 3/8" to 36" may be shaved to the Elliptoid form to eliminate "end bearing".

Shaves gears from 4" to 48" P. D.

Shaves gears from 24" to 120" P. D.



NATIONAL BROACH AND MACHINE CO.

5600 ST. JEAN • DETROIT 13, MICH.

SPECIALISTS IN SPUR AND HELICAL INVOLUTE GEAR PRACTICE
ORIGINATORS OF ROTARY SHAVING AND ELLIPTOID TOOTH FORMS

RED RING PRODUCTS

POWER THAT OBEYS A TWIST OF THE WRIST

Oilgear generator (pump) which supplies fluid power to an Oilgear motor for traversing turrets in all tanks mentioned and many others. These Oilgear systems provide high traverse speed, exceptionally accurate control and dependability.

Oilgear's EAGER RESPONSIVENESS MAY WIN A POSTWAR BATTLE FOR YOU

Alert and forward-looking "peace" machine designers and users are finding new paths to efficiency by watching the performance of machines of war . . . at war. Take for example, America's newest M3 and M5 light tanks and M4 mediums. Here, in all these, is power at the twist of a wrist, supplied by Oilgear Fluid Power systems, to enable the gunner to traverse and train the turret (and guns) on the target, quickly, accurately and without effort. He gets extreme speed instantaneously when searching out a new target. He gets extreme deceleration when he has found it, and low tracking speed as he trains his gun on the moving target or when he is moving past a stationary target. In brief, he has instantaneous torque, extreme range of speed, steplessly variable speed from zero to maximum and return. He has tremendous power in small compass. He has absolute control over power and speed, in this case, from a simple handle which he twists from side to side. Whether *you* need *these* Oilgear characteristics or a combination of scores of other functions to improve a machine, better its operation or solve a hitherto "impossible" problem, write and ask Oilgear engineers for their recommendations. There is no obligation of course. . . . THE OILGEAR COMPANY, 1308 West Bruce Street, Milwaukee 4, Wisconsin.

ARE YOU TRYING TO:

1. Apply large forces through long . . . or short . . . strokes at variable speeds?
2. Obtain automatic work cycles, variable speeds in either direction . . . with or without pre-set time dwell?
3. Apply large forces through continuous or intermittent reciprocating cycles at constant or variable velocities?
4. Obtain extremely accurate control of either position or speed of a reciprocating member?
5. Apply accurately variable pressure either static or in motion?
6. Closely synchronize various motions, operations or functions?
7. Apply light . . . or heavy . . . forces at extremely high velocities through either long or short distances of travel?
8. Obtain continuous automatic reversing drives at constant R. P. M. or over a wide range of speed variation?
9. Obtain accurate remote control of speed and direction of rotation, rates of acceleration and/or deceleration?
10. Obtain constant horsepower output through all or part of a speed range?
11. Obtain automatic torque control?
12. Obtain accurately matched speed of various rotating elements?
13. Obtain constant speed output from a variable speed input?
14. Obtain full pre-set automatic control, elimination of problems of shock, vibration, etc.?

You Need Oilgear!

OILGEAR

Fluid Power

AT LONG LAST!

Diamond Tools for every purpose in a HANDY, THRIFTY KIT!

Here's What You Get!

- 1 Abrasive diamond tool with 2.5 carats of diamonds for straight dressing wheels up to 20" x 1½".
- 1 Abrasive diamond tool with .30 carats of diamonds for straight or form dressing up to 12" x 1".
- 1 Abrasive diamond tool with .60 carats of diamonds for straight or form dressing up to 20" x 2".
- Abrasive chisel-type diamond tool for all sizes of radii.
- 1 Abrasive Red Band with diamond at 65° included angle for 0.020 radius and larger.
- 1 Abrasive Red Band with diamond at 85° included angle for 0.025 radius and larger.
- 3 Abrasive Phonopoints for 0.015 radius and larger.
- 1 Abrasive Diamond Scriber.
- 2 Abrasive Tool Holders.
- 2 Sturdy Keys.

Important: If your supply house has not yet stocked this G-P Kit, have them place your order . . . or place your own order direct for IMMEDIATE DELIVERY!

DISTRIBUTOR TERRITORIES OPEN—WRITE FOR DETAILS!

HERE'S YOUR CHANCE to get a matchless assortment of dressing tools, radius tools, cutting tools, phonopoints, a scriber and a pair of sturdy, hand tool-holders—a kit that meets practically ALL shop requirements—at a saving that speaks for itself!

And remember, you get *quality* tools, backed by three generations of diamond experience. The Abrasive RED BAND of proven performance assures you *better* work, *more* work per set-up. Each kit is numbered for your protection. Place your order TODAY!

Abrasive
DRESSING TOOL COMPANY
Detroit, Michigan

THIRD GENERATION OF DIAMOND EXPERIENCE

FORM AND MULTIPLE THREAD CUTTERS, H.S.S. OR CARBIDE

Plan-Co Form and Thread Milling Cutters are the product of years of on-the-job milling experience. Made by the makers of Plan-O-Mill Form and Thread Milling Machines, they incorporate improvements developed and pioneered by Plan-O-Mill engineers.

Plan-Co Form and Thread Milling Cutters offer you: (1) Exacting accuracy and exceptional finish. (2) Increased output and longer tool life, due to greater wear resistance.

Every Plan-Co cutter is subjected to rigid inspection with modern equipment before being approved for delivery to you.

1. First to install General Electric's remarkable new Thy-mo-trol electric feed control!
2. First planetary to mill external threads with standard multiple thread cutter!
3. First planetary to coordinate feeds and speeds!
4. First to provide absolute control of feed-in!
5. First to offer a practical, low cost carbide thread milling cutter!

FIRSTS by PLAN-O-MILL

PLAN-O-MILL CORPORATION

1511 EAST EIGHT MILE ROAD

HAZEL PARK, MICHIGAN

THREAD AND FORM PLAN-O-MILL MILLING MACHINES

THREAD AND FORM PLAN-CO MILLING CUTTERS

A.S.T.E. NEWS

NEWS OF INTEREST AND ABOUT MEMBERS

SOCIETY OPERATIONS MANUAL IN PROGRESS

To meet a long-felt need in the integration and co-ordination of Society functions, the Organization Progress Committee has undertaken the preparation of an operations manual, outlining in detail the duties and responsibilities of National and local officers and committeemen.

Will Simplify Society Operations

Assembling at the Fort Shelby Hotel, Detroit, for a three-day work session, May 18-19-20, the following members of this committee initiated the project which, when completed, will greatly facilitate and clarify the operations of each ASTE official: Past President Ray H. Morris, *Chairman;* First Vice-President A. M. Sargent, Second Vice-President W. B. Peirce, National Treasurer W. J. Frederick, Constitution and By-Laws Chairman I. F. Holland, and Executive Secretary Adrian L. Potter, as well as President C. V. Briner and National Secretary A. M. Schmit who are ex-officio members of all committees.

Considerable preliminary work had already been accomplished in former OPC Chairman Briner's survey of officeholders and Vice-President Sargent's basic outline of the projected manual.

At the Detroit meeting, assignments were made to National Committee Chairmen and other members of the Society to compile in complete detail their suggestions for the operation of the respective committees on both a National and Chapter scale.

Joint Effort of Officers

Additional specific phases of the manual were assigned to other ASTE'ers for submission to OPC Chairman Morris not later than July 1. Material from all these sources will be reviewed at a joint meeting of OPC and the Executive Committee on July 7-8-9.

Also present at the May conference were: Third Vice-President Thomas P. Orchard, Assistant Secretary-Treasurer W. A. Dawson, Education Chairman O. W. Winter, Finance Chairman Floyd W. Eaton, Program Chairman Herbert D. Hall, Public Relations Chairman Athel F. Denham, and Past President William H. Smila, each of whom participated in the discussions. OPC member and Editorial Chairman G. J. Hawkey and Membership Chairman V. H. Ericson were unable to be in attendance.

Chapter Visits Discussed

During the deliberations of the Executive Committee, the problem of visiting Chapters was studied, the National Officers agreeing that it would assist them in arranging such visits if meeting notices were received regularly from the various Chapters.

It was reported that the printing of the proposed, revised Constitution and By-Laws, now en route to each qualified voting member of the Society, had been deferred for inclusion of a comprehensive cross-index and a set of graphic organization charts, making it as complete and self-explanatory as possible. The book, in its new 8½ by 11 inch format, is more durable and practical than its spiral-bound, pocket-sized predecessor.

OPC Examines Outline of Manual

Engrossed in the study of a preliminary diagram of the prospective manual for Society operation are (left to right) OPC members C. V. Briner (Ex-Officio) W. B. Peirce, I. F. Holland, W. J. Frederick, Ray H. Morris, Chairman; A. M. Sargent, Adrian L. Potter, and A. M. Schmit (Ex-Officio).

A•S•T•E *NEWS*

A Publication of the American Society of Tool Engineers

1666 Penobscot Bldg., Detroit 26, Mich.

***Editor*, Adrian L. Potter**
***Associate Editor*, Doris B. Pratt**

Officers' Addresses

Communications may be sent directly to the Society officials mentioned on these pages, at the addresses shown in the box below. Copies of letters should be sent to the National Office, for the attention of the Executive Committee, to permit a closer integration of the work of the Society.

C. V. BRINER
930 E. 70th St., Cleveland 8, Ohio
P. W. BROWN
120 Monte Vista Ave., Ridgewood, N.J.
D. D. BURNSIDE
Yorba Hotel, 4020 W. Lafayette, Detroit 9, Mich.
F. W. CURTIS
48 Magnolia Terrace, Springfield, Mass.
W. A. DAWSON
154 Dalewood Crescent, Hamilton, Ont.
A. F. DENHAM
812 Book Bldg., Detroit 26, Mich.
R. B. DOUGLAS
621 Craig St., W., Montreal, Que.
FLOYD W. EATON
926 Penrose Ave., Detroit 3, Mich.
V. H. ERICSON
46 Gifford Dr., Worcester, Mass.
E. W. ERNST
Gen. Elec. Co., Bldg. 19-1, 1 River Road, Schenectady 5, N.Y.
W. J. FREDERICK
4758 Spring Grove Ave., Cincinnati 32, O.
H. D. HALL
H. D. Hall Co., 1060 Broad St., Newark, N.J.
G. J. HAWKEY
626 Penton Bldg., Cleveland, Ohio
I. F. HOLLAND
Pratt & Whitney Div., Niles-Bement-Pond Co., W. Hartford, Conn.
HAROLD T. JOHNSON
9060 W. Outer Dr., Detroit 19, Mich.
FRANK MARTINDELL
135 S. LaSalle St., Rm. 354, Chicago 3, Ill.
RAY H. MORRIS
7 S. Main St., W. Hartford 7, Conn.
THOMAS P. ORCHARD
American Tool Engineering Co., 1775 Broadway, New York 19, N.Y.
W. B. PEIRCE
Flannery Bolt Co., Bridgeville, Pa.
ADRIAN L. POTTER
1666 Penobscot Bldg., Detroit 26, Mich.
A. M. SARGENT
19669 John R., Detroit 3, Mich.
A. M. SCHMIT
643 Sylvania Ave., Toledo 12, Ohio
WILLIAM H. SMILA
10400 Wayburn Ave., Detroit 24, Mich.
F. W. WILSON
1666 Penobscot Bldg., Detroit 26, Mich.
O. W. WINTER
Acme Pattern & Machine Co., 1559 Niagara St., Buffalo, N.Y.

National Officers At Week-end Parley

Answering rollcall at the May 18-20 meeting of the Executive Committee are (left to right above): National Treasurer W. J. Frederick, Second Vice-President W. B. Peirce, First Vice-President A. M. Sargent, President C. V. Briner, National Secretary A. M. Schmit, Asst. Secretary-Treasurer W. A. Dawson, and Third Vice-President Thomas P. Orchard.

New Standards Chairman

William H. Smila, the Society's second President, accepted appointment on May 19 as Chairman of the National Standards Committee. Mr. Smila, who is Master Mechanic at Plymouth Div., Chrysler Corp., Detroit, and has served on the ASTE Board of Directors, in addition to an earlier term as Chairman of the Standards Committee, named Harold T. Johnson, Director, Standards Section, General Motors Corp. as Assistant Chairman, President Briner designating Frank W. Wilson, Editor of the "Tool Engineers' Handbook" as Secretary, with Past President D. D. Burnside, Engineering Dept., Republic Aircraft Products Div., Aviation Corp., Detroit, also serving on this committee.

This group will function with Second Vice-President W. B. Peirce whose duties in that capacity include the supervision of the Standards and Constitution and By-Laws Committees.

As soon as their activities are underway, additional appointments representing the machine tool, electrical, and Canadian industries will be made.

Holding its first meeting at National Headquarters June 2, the new committee reviewed the extensive program of activities for developing standards for use in tool engineering fields. An additional major portion of their discussion centered around the production of a comprehensive group of data sheets for distribution to members of the Society. Their proposals will probably be considered by the Executive Committee at its July meeting.

Committees Co-ordinate Activities

Newly-appointed National Committee Chairmen in session at the May 18-20 meeting in Detroit included (left to right above) Education Chairman Otto W. Winter, Vice-President, Acme Pattern & Machine Co., Buffalo; Program Chairman Herbert D. Hall, Owner, H. D. Hall Company, Newark, N. J.; Finance Chairman Floyd W. Eaton, Works Mgr., Crawford Door Co., Detroit; Constitution and By-Laws Chairman Irwin F. Holland, General Supt., Small Tool and Gage Div., Pratt & Whitney Div., Niles-Bement-Pond Co., W. Hartford, Conn.; and Standards Chairman William H. Smila, Master Mechanic, Plymouth Div., Chrysler Corp., Detroit.

Those named to other posts include: Editorial Committee—Chairman G. J. Hawkey, President, The Cleveland Duplex Machinery Co., Inc., Cleveland; Ray H. Morris, Vice President, Hardinge Bros., Inc., West Hartford, Conn.; A. M. Schmit, General Mgr., A. M. Schmit Co., Toledo, Ohio; and Adrian L. Potter, Executive Secretary, ASTE, Detroit. Finance Committee—W. J. Frederick, President, Frederick Steel Company, Cincinnati; P. W. Brown, Assistant Works Mgr., Wright Aeronautical Corp., Paterson, N. J.; and A. M. Schmit. Handbook Committee—Chairman, E. W. Ernst, General Electric Company, Schenectady, N.Y.; F. W. Curtis, Consulting Engineer, Induction Heating Corp., New York; R. B. Douglas, Supt., Propeller Div., Canadian Car & Foundry Co., Montreal, Quebec; Frank Martindell, Coordinating Engineer, Erie Basin Metal Products, Inc., and Adrian L. Potter. Membership—Chairman, V. H. Ericson, Vice President, Johnson-DeVou, Inc., Boston, Mass. Organization Progress—Chairman, Ray H. Morris, W. J. Frederick, G. J. Hawkey, A. L. Potter, I. F. Holland, W. B. Peirce, Vice President, Research & Development, Flannery Bolt Company, Bridgeville, Penna., A. M. Sargent, President and General Manager, Pioneer Engineering & Mfg. Co., Detroit; Public Relations—Chairman, Athel F. Denham, owner, Denham & Co., Detroit.

William H. Smila

Plastics Rich Field for Tool Engineers

Rochester, N.Y.—Plastics—their history, development and uses—were reviewed before Rochester Chapter May 9 at Rochester Institute of Technology, by Edwin M. Wolcott of the Formica Insulation Company, Cincinnati.

E. M. Wolcott

Mr. Wolcott also screened a film in color and sound, showing manufacturing processes in his company's plant, uses of their product, and some exceptional scenes of buildings in the nation's capital, in which this material was employed.

C. F. Landsheft, Boonton Molding Company, Boonton, N.J., speaking on "Die Molding," gave an interesting resume of the various types of plastics and molding methods. His technicolor sound film depicted in detail methods, machines, dies and tools used in molding plastics, opening up a fertile field to engage the talents of the Tool Engineer.

All of the approximately 100 members and guests present thoroughly enjoyed this meeting.

☆ ☆ ☆

The technical topic at the April 12 meeting, "Air Devices," was presented by J. H. Barry of the Bellows Company, Senacon Division, who showed a sound film portraying uses and applications of air operated devices for increasing production on various types of machines.

Mr. Barry also answered questions and demonstrated devices which he and his associates had brought to the meeting. The discussion was very favorably received.

Two films, "How To Dictate A Letter," and "A Recital of Faith," preceded the session.

New Group Stages "Chips" Lecture

Muncie, Ind.—Establishing a high precedent for interest with its very first meeting, Muncie Chapter's new Program Committee, under the chairmanship of Harry Vickers, presented J. A. Gibbs of Warner & Swasey Company, Cleveland, in a lecture on "Chips," at the May 9 meeting in Hotel Roberts.

Motion pictures and slides demonstrating cutting practices, tool grinding techniques and lathe operation supplemented the speaker's remarks. He also described a series of tests and experiments covering the use of carbides, being conducted by his company.

Assisting Mr. Gibbs was Thomas Sheldon who explained the assistance Warner & Swasey give in the study of lathe problems.

A sound film, "B-29's Over Dixie," completed the program.

It is planned to continue the program policy of discussing the basic problems of tool engineering before entering into more specialized developments.

☆ ☆ ☆

The April 11 meeting, attended by all committee members and officers, was devoted to organizational plans and an outline of an integrated program for the coming season. Particular emphasis was placed upon a series of educational talks of maximum interest to the membership.

Shows Duplicating of Dies and Molds

Pittsburgh, Pa.—Unusual applications of tracer-controlled machines in the manufacture of dies, molds and production jobs where precise duplication is necessary were shown and told to Pittsburgh Chapter, meeting April 6 at Fort Pitt Hotel, by Elton Miottel, research Engineer for the George Gorton Machine Company, Racine, Wis.

The Gorton-produced, technicolor sound film, "An Exact Duplicate," which Mr. Miottel screened, graphically explained these interesting processes. Many questions pertaining to problems that might be solved with the duplicator were also answered by the speaker.

As an added feature, another sound film, "Hack Saws and How To Use Them," was presented through the courtesy of the Simonds Saw Company.

Second Vice-President W. B. Peirce reported on the business accomplished at the Annual Board of Directors Meeting in Detroit.

Gotberg Speaks On Broaching

Williamsport, Pa.—Speaker of the evening at a recent meeting of Williamsport Chapter was Herman Gotberg, Chief Engineer, Colonial Broach Company, Detroit, who lectured on the proper use and handling of broaches, showing Kodachrome films describing the manufacture of the broach from the rough bar to the finish grind, as well as special applications and machines.

Herman Gotberg

Attendance at the dinner meeting totalled 46 members and guests.

Electronic Pyrometers And Machine Controls

Portland, Ore.—William H. Steenkamp, Assistant General Sales Manager in charge of field sales personnel and field engineers for Brown Instrument Company, Philadelphia, was the speaker of the evening at a special meeting of Portland Chapter held May 1 in the auditorium of the Public Service Building.

In this address on "Pyrometry," Mr. Steinkamp described the various types of pyrometers and illustrated their applications and operation, with the aid of slides, also discussing in detail the new electronic pyrometer.

The lecture and subsequent question and answer period were of great interest and value to the 42 members and guests in attendance.

☆ ☆ ☆

"Electronics As Applied To Machine Tools" was the subject presented at the meeting in Hotel Mallory April 19.

Technical speaker B. T. Anderson, Chief Electrical Engineer, Machine Tool Division, Sundstrand Machine Tool Company, Rockford, Illinois, illustrated his talk on this topic wth slides and a motion picture showing electronic controls installed on special machine tools. Keen interest in this timely subject was evidenced by the large number of subsequent questions from the floor.

Gage Checking Vital To Quality Control

Louisville, Ky.—F. E. Dardenne of the Advertising and Promotion Department, DoAll Company, Minneapolis, Minnesota, assisted by Leslie Thomson, District Representative from Cincinnati, Ohio, presented a very interesting program on "Quality Control" at the May 7 Louisville Chapter dinner meeting held in the Kentucky Hotel.

After a showing of sound films, a discussion of gage problems, stressing the importance of keeping gages accurate by constant checking with master gages, and a demonstration of gage blocks, comparators and optical flats, each ASTE member was given a Handbook of Scientific Inspection on Quality Control, with his name in gold on the front cover.

As an added attraction, an enlightening coffee talk was given by W. C. Bates, State Senator from New Albany, Indiana, and a member of the Intrastate Cooperation Commission, who expounded the subject of conflicting income tax between Indiana and Kentucky. In addition to serving in the Indiana legislature Mr. Bates is Quality Control Foreman at the Westinghouse Gun Plant in Louisville.

A change in the Chapter meeting date from the second Tuesday to the second Monday proved highly satisfactory for a record crowd of approximately 100 was in attendance.

Industry's Peacetime Challenge

Racine, Wis.—"The Job of Industry In the Postwar World" was presented to approximately 60 members of Racine Chapter when they met at the Manufacturers Association Building May 7.

Robert W. Lilley, Procurement Specialist, Smaller War Plants Corporation, Washington, outlined industry's prewar role, the gigantic task confronting it at the opening of hostilities, and the part it is expected to play in peacetime. His background and experience admirably fit him to discuss this vital subject.

☆ ☆ ☆

Hacksaw machines and blades are precision tools, Frank Wruk, Asst. Works Manager, Peerless Machine Company, Racine, told 105 members and guests at the April 2 meeting.

Frank Wruk

Pointing out that the latest hacksaw machines are recognized as the fastest precision method of sawing metal at the lowest possible cost, Mr. Wruk in his paper "Cutting Your Cost By the Hacksawing Method," stressed the importance of selecting the correct blade for the job, proper tension, feeds, speeds and coolants for maximum results.

He also described the research and service available for solving industrial sawing problems. A short film augmented his address.

Otto Jensen, the Peerless Company's Works Manager, conducted the ensuing open forum.

Among the guests was Director L. J. Radermacher who reported briefly on the recent Annual Meeting at Detroit.

Write Die-Making Book

New York—A new work on "Simplified Punch and Die Making," the collaboration of James Walker and Carl C. Taylor of North Texas Chapter, has been scheduled for publication next fall by The MacMillan Company.

Carl C. Taylor

Intended primarily to present the fundamentals of punch and die making in a manner enabling a reader unacquainted with the subject to acquire a thorough knowledge in this field, the book should also command the interest of the Tool Engineer, the Tool Designer, and the Tool and Die Maker, since it describes new materials and methods, and contains valuable tables. A glossary, unusual in books on this subject, is included. In the words of one of its authors, the book "takes the mystery and complication out of die making."

Both writers are the authors of technical articles which have appeared in *Steel, Mill and Factory,* and *The Tool Engineer.* Mr. Walker, who is Tool and Die Engineer for the G. & J. Manufacturing Company, Dallas, Texas, was previously associated with Southern Aircraft Corporation, Garland, Texas, as Tool Research Analyst and as Assistant Chief Tool Designer. His earlier industrial experience includes service with a number of companies in the East and in Texas.

Relating his passion for precision, the

James Walker

Modern Industrial Press reported in its December, 1943, issue: "Die making and the subsequent run of parts through the punch presses hold the greatest fascination for Walker. From the time each die is laid out, through the operations of contour sawing, filing and mounting, he looks forward to seeing those clean, blanked parts come off the press. It is his pride that dies made under his supervision shall have that perfect registration of punch to die necessary to turn out perfect parts and simultaneously preserve the life of the punch and die for long production runs."

Mr. Taylor, Supervisor of Tool Construction for Southern Aircraft, was formerly Vice-President and General Manager of Educational Laboratories, Inc., Brownwood, Texas, where he designed and tooled, among other products, the Ophthalmograph, an instrument used in schools to diagnose reading difficulties, and the Metronoscope, a device for the prevention and correction of reading difficulties.

Laud Hartford Manual

London, Eng.—Enthusiastic approval of the Manual on the Conservation and Salvage of Tools and Gages, published by Hartford Chapter, ASTE, is indicated in the review appearing in a recent issue of the British trade paper, *Industrial Diamond Review.*

The magazine comments, in part, under the heading, "Diamonds, Too, Are Tools":

The Hartford Chapter of the American Society of Tool Engineers, has prepared a 69-page Manual on the Conservation and Salvage of Tools and Gauges. This well illustrated booklet, brightened with caricatures, is written in almost non-technical language and compiled by an editorial staff of ten tool engineers with F. L. Woodcock as editor-in-chief.

This product of technical co-operation is really a success, since it contains in condensed form valuable information widely spread in literature or safely guarded in the files of engineering offices or in the heads of their superintendents. To have tapped these hidden sources of information alone makes this work worthy of reading by every tool engineer.

The problem itself is tackled from several angles, and owing to this some crossing could not be avoided. The broad headings are: saving in material (through brazing, forging, swaging, welding) and saving through correct design. Three chapters are devoted to salvage by brazing, chromium plating and grinding, for instance by recutting grinding wheels by a special tool and the proper use of truing diamonds.

Further recommendations are given on increasing the life of gauges and cutting tools by hard surfacing, finer finishes of tool edges, clean coolants and ammeter for watching the power consumption. Several new methods are also dealt with, for instance, the removal of broken tools by the electrolytic method and the welding method, utilization of broken tools, etc. . . . .

Concluding its digest, the English publication, of which ASTE'er Paul Grodzineki is Technical Consultant, quotes the section of the Manual devoted to diamonds.

Copies of this popular handbook are available for 75c per copy, through ASTE National Headquarters.

Aircraft Tooling

Louisville, Ky.—Covering weights, tolerances, center of gravity, practical designs, and postwar aircraft, Max Bowen, Project Engineer, Airplane Div., Curtiss-Wright Corporation, proved a well-informed speaker when he appeared before Louisville Chapter April 1[illegible].

His subject, "Tool Considerations Governing Aircraft Design," was well received, as evidenced by the attention shown and the many interesting questions propounded from the floor and ably answered by Mr. Bowen at the conclusion of his talk.

Chairman John Thomas announced, during the meeting, the names of the following chairmen to head the respective committees: **Constitution and By-Laws,** C. Raymond Emler, Attorney-At-Law; **Editorial,** Fred R. Johnson, Time and Motion Analyst; **Standards,** John H. Thomas, Superintendent, Westinghouse Naval Ordnance Plant; **Membership,** Lawrence J. Mackey, Tool Designer, Tube Turns; **Industrial Relations,** John A. Black, Mechanical Engineer, Reynolds Metals Co.; **Program,** Arthur H. Benscoter, Foreman, Tool Inspection Dept., Curtiss-Wright Corp.; **Public Relations,** Lawrence G. Carlisle, Chief Engineer, The Murphy Elevator Co., Inc.; **Education,** George H. Ochs, Co-ordinator, Ahrens Trade School; **Entertainment,** Charles H. Peters, District Representative, E. F. Houghton & Co.

* * *

Election and installation of officers for the ensuing year was the first order of business at the annual meeting of Chapter 54. Those so honored were: **Chairman,** John Thomas, Supt. of Assembly, Westinghouse Elec. & Mfg. Co.; **1st Vice-Chairman,** A. H. Benscoter, Tool & Gage Inspector; **2nd Vice-Chairman,** R. T. Samuelson, Chief Tool Des., Curtiss Wright Corp.; **Secretary,** Ancil Brown, Tool Des., Am. Rad. & Std. Sanitary Corp.; **Treasurer,** J. E. Paskey, Tool Eng., Tube Turns.

M. W. McFarlin, Special Agent, FBI, and a most enjoyable speaker, revealed some of the operations of his agency in apprehending enemy aliens, suppressing sabotage and keeping other fifth column activities to a minimum.

* * *

Highlighting his subject, "The Status of Science in Metal Working," E. V. Crane, Pressed Metal Consultant, stated before a joint meeting of ASM and ASTE that metal has greater plasticity than many of the so-called plastics. Mr. Crane's highly technical and informative, illustrated discourse, given at the Kentucky Hotel, was heard by approximately 175 members and guests.

New Wichita Executives

Wichita Chapter officers and committee chairmen for 1945-46 recently met at Druff's English Grill to lay the groundwork of activities for the coming season. An active and progressive program is anticipated by Chapter 52 whose membership has reached 185.

Shown above, left to right, are: (Seated) L. R. Glassburner, Secretary; R. W. Moore, Treasurer; H. L. Giwosky, Chairman; Roy W. Osborn, First Vice-Chairman and Program Chairman; and H. J. Bales, Editorial Chairman and Second Vice-Chairman. (Standing) K. W. Robinson, Standards Chairman; Leigh S. Icke, Education Chairman; Don F. Hansen, Public Relations Chairman; W. E. Baumann, Constitution and By-Laws Chairman; Harry McCarter, Industrial Relations Chairman; Paul Bloomingdale, Membership Chairman; and Lawrence Wells, Entertainment Chairman.

The first meeting of the new season was held April 10, with John W. Kinsey, Field Engineer, Micromatic Hone Corporation, Detroit, speaking on "Honing."

Chromium Plating Questions Answered

Minneapolis, Minn.—"How, When and Where To Use Chromium Plating," the technical topic for the May 9 meeting of Twin City Chapter at the Covered Wagon Cafe, was presented by Elmore M. Relitz, Chicago District Manager of United Chromium, Inc.

In his talk, Mr. Relitz covered those items most commonly chromium plated, such as: cutting tools, gages, plastic molds, dies, burnishing bars and rolls, printing plates and rolls, as well as all types of corrosion resisting containers.

Careful consideration as to the base metal, surface condition, plate thickness, treatment after plating, and grinding is important, according to the speaker.

G. J. Einberger, Milwaukee, representative for the Wisconsin and Minnesota area accompanied Mr. Relitz.

* * *

Approximately 150 members and friends of the Chapter were dinner guests of the Gray Company for the April 18 meeting.

ASTE'er Gunnar Widen, representative of the Gray Company, presented company officials L. L. Gray, President; R. J. Gray, Secretary and Chief Engineer; R. V. Gray, Factory Manager; and H. A. Murphy, Vice President.

Welcoming the visitors and giving background information on the "Grace" line of lubrication equipment, Mr. Murphy also highlighted the difficulties encountered in the manufacture of their "foreign" items—aircraft landing gear strut assemblies and other special hydraulic units for similar applications. Prior to cutbacks, the company was also the largest supplier of 30 and 50 caliber cartridge dies for Twin City Ordnance.

Throughout the escorted inspection tour, the group was noticeably impressed by the "good-housekeeping" evident in this busy and progressive plant, as well as by the hospitality of their hosts.

Eyster Explains Welding Methods

Milwaukee, Wis.—Daniel D. Eyster, Acro Welder Mfg. Company, Inc., was technical speaker at the May 10 meeting held by Milwaukee Chapter in the Hotel Schroeder.

The local member's subject, "Welding Applications and Fixtures," was well illustrated with an interesting display and a film, "Types of Welds and How They Are Made," showing methods explained in Mr. Eyster's talk.

Screened in public for the first time, by D. V. Stevens, the latest Kearney & Trecker film production, "Carbide Steel Milling," was very favorably received.

* * *

Astor Hotel was the meeting place April 12 when W. R. Caple, Magnesium Division, Dow Chemical Company, showed two excellent films, "Magnesium, Metal From The Sea," and "The Working of Magnesium."

As an added feature, two films sponsored by the Evinrude Motor Company depicted enticing vacation scenes in the mountains of Wyoming, and the operation of "storm boats" used in crossing the Rhine River during the German campaign.

Left Hand Should Be Production Tool

South Bend, Ind.—C. Robert Egry, Associate Professor of Mechanical Engineering at Notre Dame University, Notre Dame, Ind., was well received at the April 11 meeting of South Bend Chapter, when he lectured on "Work Simplification As It Affects Tool Design."

Stressing the fact that it is becoming increasingly important to build the skill of the operation into the machine or tool instead of leaving it to the discretion of the operator, he called the left hand a "gold-plated vise" not to be used for holding. Fixtures should be so designed, he said, as to leave this hand free for productive work. The speaker quoted an average increase of 12 per cent in production where the left hand was trained for operation.

Circular work places, good housekeeping, and the use of tools suspended from overhead springs were given as examples of proper work simplification.

"Combat America," a film recently made by Major Gable for the AAF was enjoyed by the approximately 125 present.

* * *

At the Chapter's previous meeting, Russell E. Perkey of the Sales Promotion Department, Studebaker Corporation, spoke on "The Flying Fortress Engine," illustrating his talk with a motor-driven, sectioned Wright Cyclone engine and a series of enlarged photographs of various parts of the engine and machines used in its construction.

Pertinent engineering data was detailed by Mr. Perkey who stated that the 9-cylinder, 1250 h.p. engine weighs 1350 lbs. with oil and accessories, or 1.05 lbs. per h.p. as compared with the average automobile engine which weighs from 6 to 10 lbs. per h.p. All moving parts of the 8,000 comprising the engine are machined all over for strength; no sharp corners are permitted; the nitrided cylinders have a wall hardness of Rc. 64; the supercharger revolves at 17,850 r.p.m. when the engine is running at 2,400 r.p.m.; the propeller drive has a 16:9 ratio, and the maximum pressure exerted on each piston is 15 tons, according to Mr. Perkey.

An extremely lively discussion period followed.

The Gray Company, Minneapolis, entertains Twin City group April 18. Left to right are: R. J. Gray, Gunnar Widen, William Boker, R. V. Gray, Wallace Ahlberg, L. L. Gray, S. Olsen, H. A. Murphy (addressing the gathering), Frank Gruber, and Walter Erskine.

Wage Incentives Key To Lincoln Success

Hartford, Conn.—One of the largest attendances ever present for a Hartford Chapter meeting enjoyed "New Britain Night" held April 2 at the Stanley Arena in that city. Members and guests at the dinner numbered approximately 400, with an estimated additional 200 coming in for the speaking program.

Highlighting the evening was the address, "Intelligent Selfishness In Manufacturing," delivered by the nationally-known manufacturer, James F. Lincoln, President, The Lincoln Electric Company, Cleveland. Renowned for his ability as an industrialist and for his philosophy on management-worker relationship, the dynamic Mr. Lincoln told how his company's business had been quadrupled in ten years by considering everyone associated with the firm as "worker" and by paying wage incentives on the basis of production.

As a result, the cost of a welder has dropped from $850 to $190; that of an electrode from 15 cents to 5. Expansion of business resulting from the reduced prices has brought about an increase of 400 per cent in employment, 140 per cent in dividends, and 450 per cent in average yearly earnings of workers.

Other prominent executives participating in the program included Hon. George A. Quigley, Mayor of New Britain, who stressed the co-operation of local manufacturing plants during the first and second World Wars; Everett R. Johnson, General Secretary, YMCA, who spoke for the New Britain Industrial Council; and Richard L. White, President of Landers, Frary & Clark, who acted as Toastmaster.

Through the co-operation of the New Britain Industrial Council, guests included many of the leading representatives of local industry. Entertainment was furnished by the Male Quartet of the Lions Club of Hartford.

BUY MORE BONDS

Snapped at a recent meeting, Baltimore Chapter officers shown above are, left to right: T. F. (Tom) Burke, Secretary; E. M. (Mac) McLernon, First Vice Chairman; C. Irwin (Hokey) Hochhaus, Chairman; E. P. (Ernie) Barry, Second Vice Chairman; and H. C. (Will) Will, Treasurer

Under the leadership of genial "Hokey" Hochhaus and his good-humored deputy, "Mac" McLernon, big things are expected of the Maryland group. Both are talented raconteurs—"Hokey's" yarns matching his piscatorial skill, while "Mac's" tales equal his prowess in pursuing the "little white pill."

Steel Testing Program

Cincinnati, Ohio—The return appearance of R. N. McGee, Jones & Laughlin Steel Corporation, Pittsburgh, was welcomed by Cincinnati Chapter when he addressed them on "Research and Physical Testing of Steel" at their April 10 meeting in the Engineering Society Headquarters Bldg. His company's many facilities for research and testing were shown in a supplementary color film.

R. N. McGee

As an added attraction, a new sound-color film, "An Exact Duplicate," demonstrating some of the lesser-known applications of tracer-controlled machines, was presented by the George Gorton Machine Company of Racine, Wis.

Chapter committee chairmen for 1945-46 will be: **Constitution and By-Laws**, W. J. Frederick, President, Frederick Steel Co.; **Editorial**, Jesse Daugherty, Chief Engineer, The Cincinnati Planer Co.; **Membership**, John L. Myers, Unithead Proc. Eng., Wright Aero Corp.; **Industrial Relations**, John B. Elfring, Chief Tool Engineer, Cincinnati Milling Machine Co.; **Standards**, Eugene E. Worst, Designer, Lodge & Shipley Mach. Tool Co.; **Program**, Lorin Hayden, Superintendent, Modern Tool Co.; **Education**, Charles Black, Master Mechanic, The American Tool Co.; **Entertainment**, Albert Schlattner, Factory Mgr., Cincinnati Machine Co.

Study of Crystals

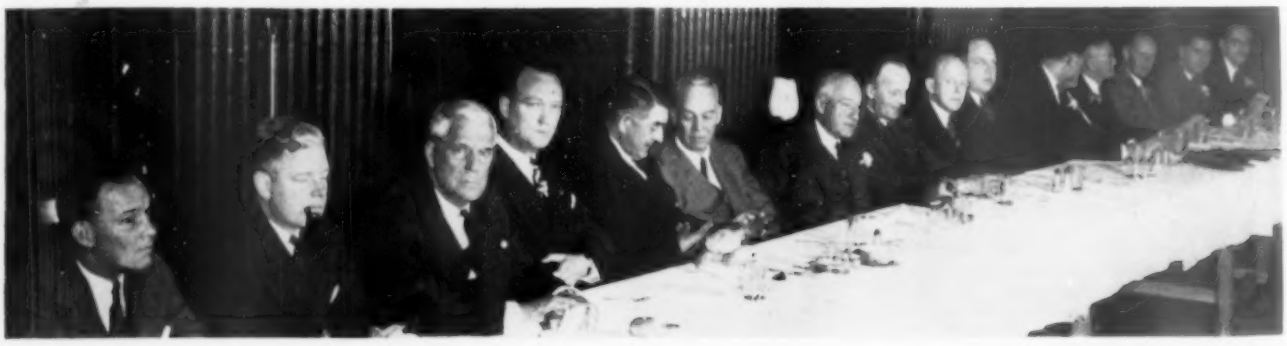
Baltimore, Md.—Speaker at the Baltimore Chapter's closing meeting of the season, held May 2 at the Engineers Club, was Dr. Carl A. Zapffe whose topic was "Study of Metal Fractures."

Dr. Zapffe described a novel concept of the microscopic structure of crystals in both metallic materials and such non-metallic substances as abrasives, a crystalline study based on his micrographic technique called "Fractography." Numerous slides were used to illustrate this new approach to certain fundamental problems which involve deformability, machinability, and fracture studies of materials used in industry today.

Formerly Assistant Director of the Research Division of the Rustless Iron & Steel Corporation, Dr. Zapffe was actively engaged in developing improvements in materials for that company. Now a private consultant in his field of research, his varied and practical experience makes him an intensely interesting speaker.

Shown below are some of the local industrial executives and other guests at the head table of Hartford Chapter's April 2 "New Britain Night." (Left to right): Richard E. Pritchard, President, Stanley Works; Richard L. White, President, Landers, Frary & Clark, and Toastmaster for the occasion; James F. Lincoln, President, Lincoln Electric Co., Cleveland, and guest speaker; George A. Highberg, Chairman, Hartford Chapter; Hon. George A. Quigley, Mayor of New Britain; Herbert H. Pease, President, New Britain Machine Co.; Maurice Stanley, President, Fafnir Bearing Co.; Stanley Hart, President, Tuttle & Bailey, Inc.; Everett R. Johnson, General Secretary, YMCA; James P. Baldwin, General Manager, Corbin Screw Corp.; S. P. Morgen, Factory Manager, P. & F. Corbin; Earl Higbe, Factory Manager, Stanley Tools; Arthur E. McEvoy, Editor, NEW BRITAIN HERALD, James Murphy, President, New Britain Industrial Council; Edmond Morancey, 1st Vice-Chairman, and Richard Smith, 2nd Vice-Chairman, Hartford Chapter.

Seated at the other end of the table, out of range of the camera, were: Stanley T. Goss, President, Goss & DeLeeuw Machine Co.; Arthur E. Thornton, President, Skinner Chuck Co.; Herbert John, President, B. John Mfg. Co.; Isaac Black, General Manager, Russell & Erwin Mfg. Co.; Royal M. Bassett, General Manager, Corbin Cabinet Lock Co.; Carl S. Newmann, President, Union Mfg. Co.; A. H. Scott, Secretary and Treasurer, New Britain Gas Light Co.; Henry Winterbottom, Chairman, Entertainment Committee, New Britain Industrial Council; William Jarvis Treasurer, and Melville Merrill, Secretary, Hartford Chapter. . . . . .



Navy Seeks Inventors' Help on Urgent Problems

Washington, D.C.—A list of 18 inventive problems, for which the Navy Department seeks solutions through the National Inventors Council, has been issued by Charles F. Kettering, Chairman of the latter agency.

C. F. Kettering

Renowned for his invention of the self-starter, his work in development of Delco power, Duco, anti-knock gasoline, electric refrigeration, the Diesel engine and many other products now in widespread use, Dr. Kettering, Vice-President in charge of General Motors Research, serves the Council without compensation. So do the eighteen distinguished inventors and engineers who act as chairmen of its special committees.

The thousands of ideas, received by the Council from many walks of life, are carefully screened and considered for all possible applications.

An illustration of the adaptability of peacetime devices to war needs is the successful land mine detector which was developed from an invention for locating sunken treasure ships.

Tool Engineers and their associates in other phases of industrial activity will seize the challenge to their ingenuity presented in the problems propounded below:

Satisfactory Shock-Proof Aerial Delivery Container not requiring a parachute; possibly pneumatic cushioned, the cushion to be inflated from a CO_2 bottle after leaving the plane. Inexpensive enough to warrant its being classed as expendable after being used once.

Beach Marker Light to be visible from 5000 yards out to sea, with rechargeable or non-deteriorating battery. Not in excess of 5 pounds weight. Effective burning time—70 hours continuous use, or 7 days of 12 hours on—12 hours off use.

Device for Transmitting Rotary Motion Through a Moisture-Proof Barrier.

Applications: Shafts for control knobs on radio equipment provided with immersion-proof cases; generator shaft for field telephones equipped with immersion-proof cases; generator shafts for hand cranked power supplies for field radio equipment.

Characteristics: Should prevent entrance of water or moisture vapor when immersed to a depth of ten feet; should offer a minimum of frictional opposition to rotary motion; should be small in relation to the equipments to which applied; should have ample power transmission capability; should be applicable to existing equipment with a minimum of modification.

Waterproof Phone Jacks:

Applications: Microphone, headphone, and key jacks for telephone equipment.

Characteristics: Should prevent water or moisture vapor from penetrating equipment, even when immersed to a depth of ten feet; should be capable of cleaning and drying without tools; should accommodate standard plugs.

Durable Plastic-Impregnated Fabric, waterproof, lightproof, weighing less than 6 ounces per square foot. Suitable for tentage.

Gasoline Resistant Coating for the interior of gasoline drums and not adversely affected by gasoline.

Oil or Liquid Knapsack Sprayer for use especially in malaria control work in overseas theaters, which, (a) is of simple construction, (b) has easily replaceable and reproducible parts, (c) has a minimum of rubber parts and gaskets, and (d) is light, rugged, durable and leakproof.

Directional-Drum Lens: The Coast Guard uses a large quantity of 200 mm., fresnal type drum lenses on lighted aids to navigation. These lenses provide a 360° fan beam of uniform candlepower about the horizon. In many instances the candlepower in a specific direction should be considerably higher than that of the uniform beam. Present practice in such cases is to install an auxiliary "spot" light to increase the intensity in the specific direction.

A need exists for a single lens which will permit the function of both of the above lights to be accomplished from a single light source. The lens should have the overall dimensions of the present 200 mm. drum lens to permit its being used in the existing housings.

Single Unit Range Light: A single optical device which will indicate with a reasonable degree of sensitivity a vessel's lateral deviation from the centerline as it proceeds along a narrow channel. Such a device must be inexpensive and low in power consumption. The conventional aid to navigation for such purposes consists of two lights on the prolongation of the centerline separated some distance from each other with the rear light higher than the front.

It is in the interests of economy, and also to provide against the fact that the terrain may make the installation of two lights impractical, that this device is needed. Economy involves current consumption and cost of structures. Existing 2-light ranges require approximately 50 KWH per year for a candlepower of 10,000 white.

Polyphase AC Integral HP Motor up to 50 HP, whose inrush current does not exceed the running current and whose starting torque equals the running torque.

Small Portable Field Strength Meter about the size and weight of a walkie-talkie for rapid checking of radio field intensities in the vicinity of radio transmitting stations. The instrument must be simple to use and accurate within plus or minus 10%. Frequency range desired is 100 KC to 20,000 KC. The range of field intensities desired is from 10 to 1,000 millivolts per meter.

Cheap and Effective Barrier to prevent the propagation of cracks in steel structures, without making use of riveted seams and the caulking, etc., incidental thereto.

Method of Welding High Pressure Piping without the aid of backing straps or with back straps which would be soluble in a harmless solution which could be introduced in the pipe before putting same into service.

Method of Measuring the Elastic Stresses locked up in steel or other metallic structures at and beneath the surface of the material without having to dissect the structure in order to record the elastic recovery which results from isolating various segments.

"Non-Slipping" Shoe Sole which will give footing on an oily, steel deck of a ship rolling as much as 17°. This shoe sole should be non-injurious to feet, non-sparking and reasonably long wearing.

Small Aircraft Type D.C. Motors without commutators, slip rings, or any moving contact arrangements, so as to eliminate service difficulties with commutators and electrical noise produced thereby.

Precision Twin-Triode Vacuum Tube with general characteristics of the current 6SN7 type having the following additional precision features:

1. After a fifteen-minute warm-up, the gm of the two sides shall be equal over the normal operating range to within +1%.

2. The tube shall be completely non-microphonic.

3. The above characteristics to be maintained over an ambient temperature range +80°C. to −40°C.

4. It should be possible to produce this tube by mass production methods with not more than 10% rejects.

Note.—Tubes presently available in production permit excessive variation in grid-plate conductance in the separate halves of the tube.

Small Hooke's Joint or Universal Joint for Instrument Use, the efficiency of which is sensibly constant with angularity of output shaft axis up to 10°. For above shaft axis angularity units, the Hooke's joint should have an angular velocity ratio of input to output shafts constant and equal to unity over the cycle with as high an efficiency as possible.

* * *

Suggested solutions should be prepared in sketch and description form and sent to the National Inventors Council, Department of Commerce, Washington 25, D.C., for consideration and report.

An idea having merit is forwarded by the Council to the governmental department which might find it useful. If the invention is acceptable, the interested agency negotiates directly with the inventor.

Pipe Machinery Honored

Cleveland, Ohio—A four-starred, Army-Navy E flag is being flown by Pipe Machinery Company, one of the first manufacturers in the Cleveland Ordnance District to receive this fifth production award.

C. V. Briner

In addition to the plain and threaded plug and ring gages and multiple thread milling cutters produced for Ordnance, the firm manufactures inserted blade milling cutters and various small tools, and builds specially-designed pipe finishing equipment for pipe mills throughout the country.

ASTE'ers contributing to the achievements prompting the award include the Society's President, C. V. Briner, Mgr., Gage & Tool Div.; William L. Benninghoff, President and General Manager of the company; Harold Hausrath, Asst. Chief Inspector; and Alex Robertson, Machine and Tool Designing.

Tooling Genius Given Carte Blanche

San Diego, Calif.—America has once more proved itself a land of opportunity in the case of Russian-born John W. Kuro, now Tool Planner at Consolidated Vultee Aircraft Corporation, who overcame linguistic problems in establishing his genius as a tool expert.

Versatile in his genius for tooling and oil painting, John W. Kuro, San Diego ASTE'er, is shown with a device which he developed.

Through the medium of written suggestions, the abilities of the local ASTE'er were recognized, leading to his being permitted to work practically freelance in planning tooling operations.

The story, as related by Alan McGrew in *The Consolidated News*, the firm's house organ, under the heading, "Russian Tool Expert Here Given Big Chance To Express Ability In Production Designs," reads: 'Genius, that power which dazzles mortal eyes, is oft but perseverance in disguise.'—Henry Willard Austin.

"Convair has a persevering genius in the person of John W. Kuro, Tooling, information brought to light this week would indicate.

"Now recognized by management for his many worthwhile ideas dealing with small tools, Kuro virtually works 'free lance' here. He has been granted permission to select any sub-assemblies and tool them to his ideas, even if new tools had to be ordered.

"Kuro showed perseverance in early schooling in Russia and as a warrior in the famous Cossacks during World War I. Wounded in that war, he persevered in his efforts to escape revolutionists in Russia and went to China. He determined to come to the land of freedom and, now here, is equally determined to be a 'good citizen' of these United States. He has his final naturalization papers.

Gets Ideas Across

"With Convair nine years, Kuro was handicapped at the outset by an accent which persists today, and lends charm to his personality. However, at first he was not generally understood when he proposed certain ideas on standard fixtures, proposing to simplify operations, save man-hours.

"But Kuro persisted. At length he learned of the Suggestions Award plan and started to turn in ideas, suggesting minor changes in small assemblies. It was then that his genius came to light.

Highest Praise

"His proudest moment came recently when he received a letter from a boy in the Navy who was under his guidance when he was lead man in Metal Bench: 'Thanks to the learning I got from you,' the letter said, 'I am now a good tool maker and machinist for Uncle Sam.'

"Kuro's appearance belies his 60 years and rugged experiences. His name originally was Koorilenko, but he changed it when he took out first citizenship papers in 1928.

Saw Lots Of Combat

"Kuro's principal schooling was in the Commercial Institute of Petrograd, now Leningrad. The government sent him to a military school for concentrated training—'schools like our Army and Navy have today'—when the first World War started and he became a second lieutenant in the Cossacks. Assisting the general staff, he saw action, suffered wounds, went to Asiatic Russia. When the Bolshevik revolution broke out, he fled to China with many other army men.

"After about three years with the Chinese, he came to this country in 1923, became a citizen five years later, served as a non-commissioned officer in the Washington National Guard and now takes pride in his affiliation with the American Legion.

"Kuro worked for Boeing and Douglas a short time before coming here. He foresaw possibilities of tool changes here based on his knowledge gained from schooling and factory work in Russia.

Lauds Idea Plan

"'I had difficulty in making myself understood. You might say I was running up against a wall until I learned of the Suggestion Award plan. I studied that. Then things started coming my way. I was made a tool planner, and was permitted to work out modifications and simplified short-cuts to help wartime production,' Kuro explained.

"Convair's patent office has taken action on several of Kuro's developments, with action on application pending at the present time.

Fleeing to China from the Bolsheviks, John W. Kuro, former second lieutenant in the Cossacks, used this Chinese passport for three years.

"Most of Kuro's ideas have been along the line of aircraft tools. Patent officials say all his suggestions have been of a practical nature.

"Now in an advisory capacity, Kuro can request time study sheets and recommend tooling changes he deems necessary. So far he has scored a high average of acceptances.

Now Studies Art

"Kuro says he actually started 'living' only a few years ago. Lately he has taken up oil painting, attending Fine Art Gallery classes, and now he has orders for some of his works. His wife teaches Russian language at University of California Extension classes in San Diego. They met in this country.

"The Kuros like San Diego, have bought their home here, plan to remain.

"How does he think up these ideas for tooling changes? He denies that it is genius, but admits he has persevered.

'For a time in Russia I was a student of philosophy,' he recounted. 'I learned how to meditate and concentrate, which has been very helpful to me.'"

Analyze Enemy Weapons

Baltimore, Md.—How new enemy equipment is located, recovered, then rushed to the Aberdeen Proving Grounds for analysis and testing, was divulged to those attending the April 4 meeting of Baltimore Chapter at the Engineers Club, by Lt. Col. George B. Jarrett, Chief of the Foreign Materiel Branch, Ordnance Research Branch, at the Proving Grounds. Col. Jarrett, considered a foremost authority on ordnance equipment, explained the process of ferreting out the capabilities and weaknesses of each item. His outstanding address, "Analysis of Enemy Weapons," was augmented with numerous slides delineating enemy ordnance and its tactical uses.

G. B. Jarrett

New Chapter officers presented to the group by Past Chairman Godfrey Steiner included: **Chairman,** C. I. Hochhaus, General Foreman, Quality Control Dept.; **Treasurer,** T. F. Burke, Tool Maker, Glenn L. Martin Co.; **1st Vice-Chairman,** E. M. McLernon, Sales Manager, Anderson & Ireland Co.; **2nd Vice-Chairman,** E. P. Barry, Sales Eng. Mgr. Machine Tool, L. A. Benson Co.; **Secretary,** H. C. Will, Chief Tool Des., Koppers Co., Amer. Hammered Piston Ring Div.

Chairman Hochhaus announced the following committee appointments: **Constitution and By-Laws,** Stewart McCaughey, Vice-President, M. S. Willett Co.; **Editorial,** W. L. Reynolds, Vice-President, L. A. Benson Co.; **Membership,** G. F. Steiner, Project Supv., Sub-Contract Dept.; **Standards,** Edward Kuzma, Asst. Supt., Quality Control Dept.; **Entertainment,** J. J. Barnickel, Asst. Supt., Experimental Dept., Glenn L. Martin Co.; **Industrial Relations,** Fred Bruggman, Secretary, Industrial Supply Co.; **Program,** E. M. McLernon, Salesmanager, Anderson & Ireland Co.; **Public Relations,** W. D. Winger, Asst. to Works Manager, Amer. Hammered Piston Ring Div., Koppers Co.; **Education,** E. M. Boylan, Machine Shop Teacher, General Vocational School.

Education Chairman Addresses Executives

Providence, R. I.—Featured speaker at Litttle Rhody Chapter's April 18 "Executive Night," held at the Crown Hotel, was National Education Chairman Otto W. Winter, who addressed the gathering on "Technical Training In Industry."

O. W. Winter

Mr. Winter outlined the apprenticeship and college courses approved by ASTE as correct tool engineering training.

750 Attend Heating Demonstrations

Detroit—Approximately 750 members and guests of Detroit Chapter gathered April 12 at the Detroit Edison Heating Plant for demonstrations of induction and dielectric heating sponsored by a number of leading manufacturers.

Industrial applications of induction heating, a process used to raise the temperature of metal parts by means of electrical generation of heat within the metal itself, require an electrical supply at a frequency of from 1,000 to 500,000 cycles. Successful applications include melting, hardening, annealing, drawing, forging and brazing.

Advantages demonstrated by this method of heat treating are: faster heating without smoke, fumes or radiant heat losses; temperature control without skilled attendance; adaptability to modern production methods in small space; a minimum of decarburization, discoloration, scale formation and warpage; close control of depth of heat penetration; and simplicity of operation with comparatively low overall production costs.

Participating in these demonstrations were Allis-Chalmers Mfg. Co., Budd Wheel Co., Federal Telephone & Radio Corp., General Electric Co., Induction Heating Corp., Lepel High Frequency Laboratories, Inc., and The Ohio Crankshaft Co.

Dielectric heating provides a similar means of heating many non-metallic materials. Electrical frequencies of from 1,000,000 to 100,000,000 cycles are required for this process. These frequencies are obtained from vacuum tube equipment such as is used in radio broadcasting. Preheating and curing of plastics, wood gluing, food processing, and dehydration are among the varied industrial applications of the process which were demonstrated by Federal Telephone & Radio Corp., The Girdler Corp., Induction Heating Corp., and The Westinghouse Electric & Mfg. Co.

Members of the Chapter were very favorably impressed with this type of session and with the exceptionally fine exhibits used in the demonstrations.

Photographs Wanted!

Public Relations Chairmen of Chapters—send PHOTOGRAPHS along with Chapter News items whenever possible.

Visual Engineering

Peoria, Ill.—A new approach to the industrial reconversion problem was presented by Homer Dasey, Administrative Engineer, Aero Manuscripts, Inc., New York, in his address, "Three Dimensional Planning," given before the May 1 meeting of Peoria Chapter.

Well qualified to discuss visual engineering, Mr. Dasey's experience includes industrial engineering in quality control and plant layout, and several years as production technician for a group of class magazines. Photographs and visual planning equipment illustrated his talk.

The dinner meeting at American Legion Hall drew an attendance of 116.

* * *

H. R. Husted, Technical Service Engineer, Celanese Plastic Corporation, New York, discussed "Tooling For Plastics" at the April 3 meeting.

The composition, types, and properties of plastics and their application to domestic and military use were included in his address. A sound film, "The Shape of Things to Come," illustrating the fabrication of plastic parts, made the plastics field comprehensible to the layman as well as to the engineer.

Regional Director Carl A. Holmer reported on the Society's Annual Meeting, briefly outlining the status of various projects.

Air Gages Applied To Precision Work

Houston, Texas—Development and use of gages and gaging instruments was the topic used by Lou Lingler of the Sheffield Corporation, Dayton, in addressing Houston Chapter April 10 at the Texas State Hotel.

Lou Lingler

Mr. Lingler's talk covered visual, mechanical, electrical and air gages, with a comprehensive demonstration of the principle of the air gage and its use in the manufacture of parts to extremely close tolerances. Slides, showing the various gages under discussion, and a question and answer period supplemented the discussion.

The coffee speaker, J. H. Treer, General Manager, Hughes-Dickson Gun Plant, gave an interesting resume of the centrifugal casting of heavy cannons.

As an added feature, the sound film, "Fortress Japan," was shown to the 98 members and guests present.

Quality Control Efficiency Tool

Schenectady, N.Y.—F. T. Lyons was the speaker at the April 12 meeting of Schenectady Chapter at the Elks' Club.

Mr. Lyons, General Manager of the Do-All Hudson Company, Hudson, N.Y., talked on "Precision Measurements In Industry," elaborating on the development of gage blocks to interpret the standard inch.

The applications and advantages of the electric comparator gage and mobile inspection units were emphasized by the speaker, as well as the use of quality control as a tool of efficient management.

Previous to the meeting a roast beef dinner was enjoyed by approximately 100 members and friends.

Diesel Injection Systems

Springfield, Mass.—Elaborate preparations preceded the presentation of "American Bosch Night," Springfield Chapter's April 9 meeting at Hotel Highland.

Special movies, slides and exhibits were prepared by the company's personnel for the program on "Diesel Injection Systems." Principal speaker was B. Loeffler, Chief Engineer at the Bosch plant, who reviewed the background and development of the Diesel principle and systems of fuel injection before showing the films, "The Diesel Engine" and "Bosch Tooling."

Director Frank W. Curtis reported on the Directors meeting recently held in Detroit.

Dinner was served to 135, the meeting attendance increasing to approximately 150.

* * *

"Indian Motorcycle Night" featured the previous meeting, with two of this company's films, "Speeding To A Championship" and "Trail of the Jackpine" being shown and narrated by representatives from the Springfield concern.

J. J. Cordiano, Research Engineer, Hardy Metallurgical Company, New York, was the technical speaker, addressing the Chapter on the various applications of "Powder Metallurgy." His talk embraced the manufacture and characteristics of metal powder, powder metallurgy equipment, and the application of powder metallurgy to production.

Pioneers in this field, Mr. Cordiano's company has had vast experience in developing this work with unusual alloys and their ultimate applications.

Broaching Procedure

Buffalo, N. Y.—Speaker of the evening at the April meeting of Buffalo-Niagara Frontier Chapter was Chief Service Engineer McCumber, LaPointe Machine Tool Company, Hudson, Mass., who was assisted by Chief Engineer Fannel and Field Engineer West of the same company.

Following their presentation, the audience participated in a lively discussion of postwar broaching procedure as compared with other machining processes, particularly in the aircraft and automotive fields.

A moment of silent prayer was observed in memory of a deceased member, New W. Burbridge.

Honing Told and Shown

New York City—Closing its 1944-45 season, Greater New York Chapter met May 7 at the Hotel New Yorker.

Highlight of the evening was a discussion on "Honing" by John W. Kinsey, Field Engineer, Micromatic Hone Corporation, Detroit. After describing modern honing applications, Mr. Kinsey showed films featuring these processes. He was assisted by George Eldred, Eastern District Field Engineer, New Haven, and Harry Brothers, Field Engineer, Paterson, both of Micromatic.

J. W. Kinsey

An interesting display of honed pieces supplemented the presentation.

"Gripes" On Standards

Philadelphia, Pa.—Efforts to improve shop standards, through the institution of a series of "Gripe and Grouch Sessions" to discuss unsatisfactory conditions and practices, are being made by Philadelphia Chapter under the direction of Standards Chairman Fred L. Creager.

F. L. Creager

A tickler appended to the monthly meeting notice is being employed to remind members to submit items for consideration, along with the recommended corrective action.

Discussion at the first open forum, attended by some 150 Chapter members, resulted in the endorsement of the following proposals as worthy of consideration and action by the National Standards Committee:

1. "The provision on machine tools of an electrical outlet, in a chip-free location, whereby a light source might be 'plugged in.' This would obviate the necessity of the house electrician installing a light line (as well as a power line) to the machine. In the case of lathes, a duplex outlet should be installed, thus also permitting operation of a tool post grinder when required.

2. "A definite recommendation that all floor-mounted engine lathes be provided by the manufacturers with a leveling means, preferably screw adjusted.

3. "Correlation of tool parts and tool holders, as to slot and shank, width and height.

4. "Standardization of tee-slot dimensions on miller, shaper and planer tables, rotary tables and lathe face plates."

Chairman Creager's committee has established high standards for its own operation, which include:

a. "To determine by discussion between the Standards Committee and general Chapter membership those conditions, materials, tools, machines, etc. which are not in agreement with conventional and good engineering practice. This activity to include three major fields, viz: machine tools; dies, jigs and fixtures; and non-durable tools.

b. "To present to the National Standards Committee and Philadelphia Chapter members recommended changes to alleviate the conditions encountered.

c. "To receive for consideration, study and action, recommendations from the National Standards Committee."

Results of subsequent sessions on the elimination of undesirable shop conditions and engineering practices will also be presented to the National Standards Committee.

Electronics Change Speeds and Feeds

San Diego, Calif.—More than one hundred members and guests attended the April 13 San Diego Chapter dinner meeting in the San Diego Women's Clubhouse when B. T. Anderson, Electrical Engineer, Sundstrand Machine Tool Company, Rockford, Illinois, spoke on "Electronics As Applied To Machine Tools," explaining with the aid of slides the extreme flexibility of electronic machine tool drive control.

Methods of wiring motors for various uses and the application of special electric motors on machines to do special jobs were also described. Of great interest to many with war-born production problems was the stepless speed and feed changes possible during a machine tool operating cycle.

The speaker also showed motion pictures revealing the application of electronic control to the machining of an airplane motor cylinder head. The varied contour changes necessitated rapid speed and feed adjustments, accomplished by automatic electronic motor control.

Another film depicting the Army, Navy and Marine amphibious landings on Ankora and Pelelieu was also screened.

Because of the lateness of the hour, guest speaker H. E. Whittemore, Manager of the Industrial Department, San Diego Chamber of Commerce, asked that his talk on the "Postwar Potentialities of San Diego" be postponed.

Through the courtesy of Education Chairman Gus Arends, the members had an opportunity before the meeting to peruse a collection of technical books and magazines, a service which will be maintained at future meetings.

Modern Gear Shaving

Grand Rapids, Mich.—Robert D. Drummond, President, National Broach & Machine Company, Detroit, was guest speaker at Western Michigan's April 9 meeting.

Assisted by Ben Bregi, Executive Engineer for his company, Mr. Drummond discussed the modern practice of gear shaving, roto-milling, and shaving in precision machining.

Attendance at the Rowe Hotel dinner meeting totaled 98.

* * *

"Fixtures—Their Use and Design" was narrated by J. L. Hayes, Industrial Relations Dept., Siewek Tool Div., of Domestic Ind., Inc., Detroit, at a recent meeting. Mr. Hayes described standard pump drill jigs and clamping fixtures to the 88 gathered at the Occidental Hotel, Muskegon.

Gearing Prospects Post-War

Toronto, Ont.—An outstanding speaker, ASTE'er George H. Sanborn, Chief Field Engineer, Fellows Gear Shaper Company, Springfield, Vermont, was featured at the April 9 meeting of Toronto Chapter in Malloney's Art Gallery.

G. H. Sanborn

Mr. Sanborn gave an excellent talk on "Post-War Gears," showing two films, "A History of Gearing," and "The Manufacture of Pratt & Whitney Engines By Buick," as well as answering many questions from the audience.

National Assistant Secretary-Treasurer W. A. Dawson of Hamilton reported interestingly on the Detroit meeting of the Board of Directors.

The 56 members who sat down to dinner were joined at the meeting by 44 visitors.

Silver "W" To Thomas

Louisville, Ky.—A Silver "W," the Order of Merit Award—highest honor bestowed by the Westinghouse Company for outstanding service—was given recently to John H. Thomas, Superintendent of Assembly, Rockets and Projectiles at the Louisville Naval Ordnance Division.

Presented by Vice President F. D. Newbury and witnessed by C. E. Shiplet, Manager of the Louisville Plant and a member of ASTE, the award reads: "For his ability to organize the assembly and tests of Naval Ordnance materiel, for his efficiency in imparting his knowledge to associates in a way that makes for higher quality at lower cost, for his cheerful willingness to take on any tasks that may add to the reputation and productivity of Westinghouse."

Ever since his affiliation with ASTE in 1937, Mr. Thomas has been active in the Society both locally and nationally, having served as Publicity Chairman of Pittsburgh Chapter and of the Semi-Annual Meeting held in that city in 1938, also as Treasurer, First Vice Chairman and Standards Chairman of Louisville Chapter of which he is now Chairman. He has also held the office of Southern Area Vice Chairman of the National Standards Committee.

Vice President F. D. Newbury, Westinghouse Co., congratulates John H. Thomas, Supt. of Assembly, Rockets and Projectiles at the Louisville Naval Ordnance Div., on winning the Silver "W," highest honor conferred by the company. C. E. Shiplet (left), Manager of the Louisville plant, witnesses the presentation.

Aerial Reconnaissance First Used by "TR"

Richmond, Ind.—"Aerial Reconnaissance By Photography" proved a fascinating topic as unfolded to Richmond Chapter, May 8, by Major L. L. McGladdery of the Photographic Laboratory, Engineering Division, Air Technical Service Command, Wright Field, Dayton.

Emphasizing the reliance placed upon aerial photography by war commanders, he related that Gen. Patton was delayed several days awaiting clear weather to complete aerial reconnaissance before his break-through in France. Theodore Roosevelt was the first to use this medium, when he stormed San Juan Hill, the speaker recalled. He also discussed various types of equipment necessary for making and processing photographs taken from an airplane.

☆ ☆ ☆

"The Crush Dressing of Grinding Wheels and Use of Multiform Wheels for Grinding Threads and Intricate Forms" was the subject of a talk given before Richmond Chapter by C. J. Linxweiler of the Sheffield Corporation, Dayton, April 10.

Mr. Linxweiler illustrated his lecture with several charts and pictures, showing how this method of wheel dressing is used and what can be accomplished with it. Stressing the economies effected and the increased accuracy obtained, he displayed grinding wheels formed by crush dressing, the dressing rolls themselves, and several samples of work which had been ground with these wheels.

Chairman Roland Lockridge announced as his selection of committee chairmen for the coming year: Constitution and By-Laws, Robert A. Schafer, Chief Development Engineer; Membership, Earl S. Kinnear, Asst. Chief Tool Engineer; Program, Herman E. Granberry, Supervisor, Tool Design; Public Relations, Paul C. Hermansdorfer, and Historian, Lowell B. Penland, Tool and Fixture Designers; Entertainment, LeGrand Terry, Chief Tool Engineer; all of National Automatic Tool Company; Editorial, Harold B. Tappen, Asst. Chief Engineer, Automotive Gear Works; Industrial Relations, Leslie W. Court, Plant Engineer, International Harvester Company, Richmond Works; Standards, Alfred F. Knose, Process Superintendent; Education, William E. Small, Chief Tool Engineer; Budget Director, Jesse W. Johnson, Materials Engineer, all of Perfect Circle Piston Ring Company; Program Advertising and Yearbook, Louis F. Wahl, Owner, Acme Pattern Works.

Among distinguished guests present were Lt. R. C. Cunningham, U.S.N., Industrial Incentive Division, who gave a short talk on the perils of an industrial let-down at this time, and Sgt. Frank Nichols of the Tank Destroyer branch with Gen. Patton's army in Germany.

National Officer Outlines Duties

Pontiac, Mich.—Speaking informally, First Vice President A. M. Sargent of Detroit explained to the newly-chartered Pontiac Chapter ASTE membership qualifications and committee duties, when they met April 19 at the Roosevelt Hotel.

Two films, "The Glass Case," and "The Great Silk Route," were shown to the audience of 41, through the courtesy of General Motors Corporation.

Induction Heating Author Speaks

Fond du Lac, Wis.—Meeting at the Hotel Retlaw, April 13, 87 members of Fond du Lac Chapter heard a very instructive lecture on "Induction Hardening and Brazing" by Dr. H. B. Osborn, Jr., Director of Research, Ohio Crankshaft Co., Cleveland.

Dr. H. B. Osborn, Jr.

Dr. Osborn, who was accompanied by R. L. Willis of his company's Milwaukee office, explained the process as used in the Tocco System, illustrating his remarks with slides. An ASTE convention speaker, he is the author of many technical papers on induction heating.

Announcement was made of Fon du Lac's achievement in winning the Membership Trophy for 1944, with all members urged to co-operate in the 1945 contest.

Guests included Luis Garay of the Peruvian Navy, G. Salikhor from the U.S.S.R., and Director L. J. Radermacher who reported on the Annual Meeting and the proposed revised Constitution.

Freight Tonnages Up— Car Wheels Unchanged

Port Arthur, Ont.—The importance of railways to Canada's war effort and the dependence placed upon the wheels of rolling stock were emphasized by Alexander C. Adams, Manager of the local branch of Canada Iron Foundries Ltd., at the April 17 meeting of Lakehead Chapter, held in Legion Hall.

Using "Foundry Practice" as his subject, ASTE'er Adams explained in detail the making of chilled tread cast iron car wheels. Although car tonnages have increased from 15 to 120 tons, the wheels are substantially the same as they were a hundred years ago, the speaker indicated.

Mr. Adams was bombarded with searching and scientific questions in the stimulating discussion which followed his interesting lecture.

The screening of two films, "The Construction of Large Cannons," and, "Tools of War," completed the program.

Forming and Drawing Techniques

St. Louis, Mo.—"The Plastic Flow of Metal in Forming and Drawing Operations" was the subject of an address by W. M. Evarts of E. W. Bliss Company, Brooklyn, N.Y., delivered before St. Louis Chapter, April 5, at Hotel Melbourne.

Mr. Evarts, who knows his subject well, gave a clear, concise lecture on both the technical and practical aspects for calculating, and the flowing of metal in forming and drawing operations, supplemented with slides, motion pictures and samples.

One hundred and seventy-six members and guests were on hand to greet the newly-elected officers. Chairman Willis Ehrhardt announced as his appointees to committee chairmanships: Constitution and By-Laws, Kort Pfabe, Ass't to Chief Inspector; Public Relations, Ernest H. Nieman, Superintendent, Carter Carburetor Corp.; Editorial, Bernard W. Ammann, Tool Designer; Standards, William Greene, Tool Designer, Emerson Electric Mfg. Co.; Membership, H. Irwin Haupt, Vice President, Production Tool and Supply Co.; Industrial Relations, William H. Scheer, Owner, W. H. Scheer Prod. Tools; Program, Jacob J. Demuth, Superintendent, Klein Mfg. Co.; Education, William A. Diefenbronn, Vocational High Teacher, Granite City High School, Granite City, Illinois; Entertainment, Albert W. Needham, Tool Engineer, Atlas Tool & Mfg. Co.

San Diego Joins Chamber of Commerce

San Diego, Calif.—A welcome to membership in the local Chamber of Commerce was extended to San Diego Chapter by H. E. Whittemore, Manager of the Industrial Division, who was a guest at the ASTE'ers April 13 meeting. Mr. Whittemore spoke briefly, outlining the research and postwar planning now being undertaken by the Chamber.

In full accord with the recent Chamber of Commerce industrial survey, the Chapter aims to take an active part in retaining and increasing the industrial activity in this area.

Mr. Whittemore is expected to address them in the near future, reporting on a complete study of the postwar potentialities of San Diego as a business and manufacturing center.

W. H. Asmus, San Diego Chapter chairman (right) introduces H. E. Whittemore, San Diego Chamber of Commerce, who welcomed group to Chamber membership.

"Honing Steps Ahead"

Hamilton, Ont.—John W. Kinsey, Field Engineer, Micromatic Hone Corporation, Detroit, was technical speaker at the April 13 meeting of Hamilton Chapter held in the Iroquois Hotel, Galt. His address, "Honing Steps Ahead," was followed by the screening of two sound films, completely covering the subject.

The Detroit automotive industry, ASTE's origin, and the Society's activities in industry were outlined by F. J. Jeschke, Field Engineering Manager for Micromatic, who accompanied Mr. Kinsey. An informal discussion period completed the program.

Dinner, served to approximately 100 Chapter members and guests, was highlighted by Charlie McGregor's rendition of Scotch songs.

File Making and Use

Philadelphia, Pa.—Files—their history, shapes, manufacture and use—occupied the 170 members who attended the April 19 meeting of Philadelphia Chapter at the Engineers Club, featuring Walter R. Buerkel, Factory Representative, Nicholson File Company, Providence, R.I., as technical speaker.

Mr. Nicholson in his address on the "Manufacture and Application of Files," described heat treating in file making, file teeth and their proper applications to jobs. A film illustrated his talk.

Elton Miottel of the George Gorton Machine Company, Racine, Wisconsin, gave a coffee talk, "An Exact Duplicate," describing new and unusual applications of the pantograph engraving machine, augmenting his remarks with an exceptionally fine film portraying contour milling and other processes.

Bach Describes Steel Hardening Processes

Springfield, Vt.—Nearly 100 members and guests of Twin States Chapter gathered April 11 at the Community House to hear A. Dudley Bach, President of the New England Metallurgical Society, Boston, deliver an illustrated talk on "Surface Hardening of Steel."

His excellent presentation covered the various methods of heat treatment, including carburizing, salt bath, nitriding, flame and induction hardening, interesting applications of these processes being shown in slides.

Director Frank W. Curtis of Springfield, Mass., spoke on the importance of the work of the Society's Education and Standards Committee, also reporting briefly on the Annual Meeting of the Board of Directors.

The meeting closed with colored motion pictures of the Alcan Highway. Produced by the Allis-Chalmers Company, the film portrays very vividly the hardships and endurance of both men and materials in the construction of this masterpiece of engineering.

* * *

Speaker at the installation meeting and reception in honor of incoming and retiring officers was Dr. Karl Bercovici (Dr. Walter Simms) a former professor of engineering at the University of Prague, Czechoslovakia, who is in this country organizing a Post War Engineering Program in the interest of several Allied groups. In addition to outlining this program, Dr. Bercovici described some of his experiences in traveling through various countries.

Marine Recounts Pacific Service

Los. Angeles, Colif.—Verlin R. McCall, Pharmacist Mate, Second Class, U.S.N., was one of the speakers at the May 10 meeting held at Scully's Cafe by Los Angeles Chapter, giving a vivid account of his experiences while serving ashore with the Marine Corps on various Pacific Islands, including Saipan where he was wounded.

V. R. McCall

Appealing to all able-bodied men to visit the local blood bank, he emphasized the urgency of maintaining this service until the conclusion of hostilities in the Pacific.

Frank Riffle, Regional Manager for the Kearney & Trecker Corporation, introduced as technical speaker Dr. A. O. Schmidt, Director of Metal Cutting Research for that company, who gave an informative talk on carbide steel milling. A Kodachrome sound film and slides illustrated the use of carbide in milling steel.

* * *

Guest speaker at the April 12 meeting was B. T. Anderson, Electrical Engineer, Sundstrand Machine Tool Company, Rockford, Illinois, whose subject was "Electronics As Applied To Machine Tools." After a short outline of the basic principles of the electronic tubes and their application in the control of motor speeds, demonstrating the application of electronic controls as applied to his company's machines, Mr. Anderson showed slides and motion pictures illustrating his talk.

B. T. Anderson

Through the courtesy of the Firestone Tire Company a film, "Twenty Years a Champion," showing the Indianapolis races of other days, was screened for the audience of 228 members and guests.

During dinner The Great Ravel, King of Deception entertained with magic.

Gear Production Methods

Windsor, Ont.—George H. Sanborn, Chief Field Engineer, Fellows Gear Shaper Company, Springfield, Vt., explained "Gear Production" to approximately 100 members and guests attending the May 13 meeting of Windsor Chapter at the Prince Edward Hotel.

Following his address, he presented films on the evolution of power transmission by gears and the assembly of Pratt & Whitney aircraft engines by Buick. A lengthy discussion on operations pertaining to gear shaving and gear production methods concluded the technical program.

Twenty-three members of the Ford Trade School were present, including Kenneth Sontar and Roger Vandoorne, the two outstanding students of the month who were guests of the Chapter, the customary recognition of apprentices' accomplishments.

Aluminum Application—Present and Future

Fort Wayne, Ind.—Two outstanding speakers were dinner guests of Fort Wayne Chapter on May 9 at the Chamber of Commerce.

Captain Frank Bodenhorn, Commanding Officer of Camp Thomas A. Scott, discussed "The Prisoner of War Program." A veteran of World War I, he has been in charge of German and Italian war prisoners at Camp Scott and Camp Perry, Ohio.

The story of the growth of the Aluminum Company of America from a small, one-man shop to its present position as one of the largest corporations in the world was told by G. V. Craighead, Sales Engineer for that company. The accompanying technicolor film, "Unfinished Rainbows," depicted the never-ending search for commercial applications of the light weight metal and its vast possibilities in post-war developments. A second film, "Aluminum Fabricating Processes," portrayed actual production, extrusion, drawing, casting and machining methods. Approximately 90 members and guests were in attendance.

* * *

"The Rotary Head Method of Milling" was the technical topic at the April 11 meeting, D. S. Stevens, Sales Engineer, Kearney & Trecker Products Corp., Milwaukee, explaining how this comparatively new precision machine, under the impetus of the war effort, is turning out highly accurate die sets, plastic molds, die cast molds and intricate forming work. The speaker described five different methods of making molds, and the determination of the proper type according to the design of the piece to be molded. The subject was well illustrated with slides and films.

Newly-appointed committee chairman introduced included: Paul R. Weitzman, Supt., Machine Dept., Bowser, Inc., Constitution and By-Laws; John J. Joel, Mgr., Process Dept., Farnsworth Tel. & Radio Corp., Editorial; John F. Davis, Tool Engineer, Fries Tool Mach. Works, Inc., Membership; Edward G. Chambers, Sales Engineer, Oatis-Booth Mach'y Co., Indianapolis, Industrial Relations; Norwood H. Booker, Tool Designer, Standards; Emil W. Mellin, Chief Tool Designer, International Harvester Co., Program; Olney Adkinson, Planning Engineer, Tokheim Oil Tank & Pump Co., Public Relations and Publicity; Carl H. Buecker, Tool Engineer, Magnavox Co., Education; Arthur W. Nichols, Section Planning Supervisor, Entertainment; Wilmer H. Kibiger, Tool Designer, General Electric Co., Sickness and Welfare.

NCR Demonstrates New Payroll Machine

Dayton, Ohio—Host to Dayton Chapter, April 16, the National Cash Register Company entertained about 70 members with a roast turkey dinner and plant tour.

Messrs. Corbin and Chaffee of the company's Sales Department explained the manufacture and application of a new payroll calculating machine developed to meet the need of expanding payroll deductions.

Opportunity was also afforded for the ASTE'ers to inspect the intricate machine composed of 20,000 moving parts.

Steel Selection

Chicago, Ill.—E. A. Hoffman and J. M. [illegible]dsong, from the Metallurgical and [illegible]gineering Staff of LaSalle Steel Com[illegible]y, were the technical speakers for the [illegible]ril 2 dinner meeting of Chicago Chap[illegible] held at Huyler's Restaurant.

Their joint presentation, "Selection Suitable Steels For Induction Hard[illegible]ing," was supplemented with slides on [illegible]e use of high frequency current in [illegible]rdening steels, the treatment of steels [illegible]th sodium sulphite, and their effect on [illegible]tting tools.

Chairman Frank A. Armstrong intro[illegible]duced his newly-appointed committee [illegible]hairmen who include: **Constitution and By-Laws,** Roy R. Hoefer, Owner, The Hoefer Engineering Co.; **Editorial,** R. F. Erickson, Tool Design Dept.; **Standards,** Frank M. Kincaid, Technical Supervisor, Chrysler, Dodge-Chicago; **Membership,** M. V. Sheldon, Manager, Gagefix Mfg. Co.; **Industrial Relations,** Ben C. Brosheer, Associate Editor, *American Machinist;* **Program,** Clare Bryan, Chief Tool Designer, Link Belt Ordnance Co.; **Education,** Clifford E. Ives, Owner, Ives Engineering Co.; **Public Relations,** Harry Nelson, Vice-President and Secretary, Charles L. Anderson Machinery Co.; **Entertainment,** Lawrence J. Kollath, Process Engineer, Illinois Div., Bendix Aviation Corp.

Director Frank Martindell, a Chapter member, explained the provisions of the Constitutional amendments being presented to the membership for vote.

Plans were enthusiastically made for a series of plant tours to be scheduled during the summer months.

Common Sense Education

Indianapolis, Ind.—Executives of local industrial plants were dinner guests at the April 5 meeting of Indianapolis Chapter, held in the Lincoln Hotel.

Guest speaker Dr. John J. Caton, recently retired Director of Chrysler Institute of Engineering, Detroit, told the record audience of more than 300 about "Common Sense In Education." He described methods of selecting students for training in subjects for which they were best fitted.

Admiration was expressed for the fearless manner in which Dr. Caton expressed his views on education which are at variance with some of the opinions held by educators. An Honorary member of ASTE, Dr. Caton's popularity as a speaker is evidenced in the fact that his appearance at Indianapolis Chapter was a return engagement.

New Atlanta Officers

Initiating the duties of their respective offices at the April 4th meeting of Atlanta Chapter are (left to right): G. W. Brown, Secretary; J. C. Cogburn, Jr., Treasurer; S. W. Barnett, Chairman; Charles M. Jenkins, Second Vice Chairman; and Charles W. Moore, First Vice Chairman.

Technical speaker at the meeting, held in Woodings Cafeteria, was H. F. Joslin, General Superintendent, Federal Products Corporation, Province, R. I., who presented some interesting new developments in "Dial Indicators, Comparators, and Their Applications," supplementing his lecture with an informative film.

Microscopic Engraving

Boston, Mass.—The microscopic engraving of the Lord's Prayer within a .005" diameter circle was described by Elton H. Miottel, Customer Research Engineer, George Gorton Machine Co., Racine, Wis., in bringing the possibilities of the pantograph engraving machine before the April 12 meeting of Boston Chapter held in Schrafft's Restaurant.

E.H. Miottel

Mr. Miottel briefly sketched the history of tracer controlled equipment and its uses in laboratories, jobbing and production work. Electrical equipment is used for the removal of large amounts of stock while a manual machine is employed in removing smaller amounts, where fine detail is required, with a three-dimensional machine handling the finest work, the speaker stated. He also explained the principle of profile grinding and the operation of a compensating wheel which makes allowance for wheel wear and dressing.

Many operations of production profiling, contour grinding, die and hob making, multiple etching, and tracer-controlled duplicating were shown in the Gorton film, "An Exact Duplicate," screened by Mr. Miottel.

Donald J. Morten, Shop Manager, Controller Corporation, introduced a gadget to produce a crinkled spring with two punched holes, sheared to length at the same operation in a kick press. The gadget, made in 30 hours, can turn out 180 springs per hour.

Director W. W. Young, who presented a Past Chairman pin to retiring Chairman Henry J. Richards on behalf of the Chapter, gave a full account of the recent Annual Meeting of the Board of Directors.

Chairman Arthur A. Nichols announced as appointees to committee chairmanships: **Constitution and By-Laws,** Walter F. Jones, Planning & Methods, General Electric Co., Everett; **Editorial,** Walter B. Pohle, Supt., Spray Eng'g. Co., Somerville; **Membership,** Standish S. Rowe, Carbide Tool Engineer, Arthur A. Crafts Co.; **Industrial Relations,** John L. Morosini, Service Representative, D. A. Stuart Oil Co.; **Standards,** Joseph P. Crosby, Superintendent, Lapointe Machine Tool Co., Hudson; **Program,** J. B. Savits, Methods Eng., Pneumatic Scale Corp., Ltd., North Quincy; **Public Relations,** George Q. Packard, Partner, Packard Machine Co., Cambridge; **Education,** Robert E. Powell, Tool Engineer, F. H. Robertson Co., Malden; **Entertainment,** G. Russell Wyman, Engineer, Socony-Vacuum Oil Co., Cambridge; **Publicity,** Alan M. Brown, Designer, W. H. Nichols & Sons, Waltham.

Dr. John J. Caton, retired Didector of Chrysler Institute of Engineering and an Honorary member of ASTE, delivering his address, "Common Sense In Education," to Indianapolis Chapter.

Elected officers and committee chairmen of the recently-chartered Flint Chapter (left to right, seated): Archie Campbell, Treasurer; Robert G. Freeman, First Vice Chairman; Michael Skunda, Chairman; Harlan Pierpont, Secretary; and George Bennett, Second Vice Chairman.

(Standing, in same order): Leon A. Pratt, Constitution and By-Laws; N. F. Snyder, Entertainment; L. A. Kitchen, Public Relations; D. B. Green, Standards, and Arthur Charlesworth, Editorial.

Arthur W. Close, Membership, and A. P. Lind, Industrial Relations, were not present when the photograph was taken.

Tour Jack & Heintz Plant

Cleveland, Ohio—Flaunting superstition, 267 members of Cleveland Chapter found Friday, the 13th of April, an extremely lucky day, for it brought them opportunity to visit the much-publicized plant of Jack & Heintz, Inc., with "Bill" Jack, the company's president, as host.

A hearty dinner served in the plant cafeteria, accompanied by an orchestra and vocalist, preceded the address of welcome by Mr. Jack who introduced William Taab, Production Manager of the plant. The latter explained the policy of close relationship between management and "associates," as the employees are called, that has contributed to Jack & Heintz' outstanding war production record.

In the subsequent tour of the plant, first-hand knowledge was gained of the latest innovation in milling, drilling, broaching, heat treating and grinding operations, from the smiling "associates" who bear out Mr. Jack's theory that management and labor can work harmoniously with all barriers removed.

This keenly-anticipated event so exceeded everyone's expectations that the group is looking forward to a "return engagement."

* * *

Signally successful, the joint meeting of all Chapter Committees at the East Side Turners Hall, April 27, met with unanimous approval of the continuation of such sessions, affording an opportunity for discussion and interchange of ideas among the various departments of the Chapter.

Jig Boring Problems

Binghamton, N.Y.—An outstanding technical session was presented by Binghamton Chapter, April 4, at the Arlington Hotel when F. O. Hoagland, Chief Engineer, Pratt & Whitney, West Hartford, Conn., addressed 88 members and guests on "Jig Boring and Problems Connected Therewith."

F. O. Hoagland

Mr. Hoagland, a popular Chapter speaker, reviewed the history of measurement standards to the development of the present precision measurements, and their relation to jig boring methods and equipment. Slides illustrated the talk.

New Chapter committee chairmen will be: **Constitution and By-Laws,** Willard R. Sweet, Process Analyzer; **Industrial Relations,** Roger E. Coles, Manager Tool Design; **Membership,** Wendell L. Harper, Tool Engineer; **Education,** Richard M. Bell, Tool Design; **Public Relations,** Dean H. Erlenmeyer, Tool Analyzer, International Business Machines Corporation, Endicott; **Editorial,** Robert Craver, Tool Engineer, Ansco Corp.; **Standards,** J. Donald Ahearn, General Manager, Universal Instrument and Metal Co.; **Program,** Ellsworth Barnes, Asst. to Chief Tool Inspector, Scintilla Magneto Div., Bendix Aviation Corp., Sidney; and **Entertainment,** Ralph V. Stecker, Tool Engineer, Botnick Motor Corp.

Profilometer Uses Told

Flint, Mich.—Development of the Profilometer, an electrical instrument for measuring the degree of surface roughness, was outlined by Dr. Ernest J. Abbott, President and Director of Physicists Research Company, Ann Arbor, speaking before Flint Chapter April 19.

By moving a diamond tracer across the surface to be checked, the number of microinches of roughness is indicated on a gage, Dr. Abbott explained. Used extensively in this country and abroad, the device makes it possible to check the desired finish as specified on engineering drawings and also to duplicate readings at various plants. In the present aircraft program, the Profilometer is indispensable.

Dinner, served to 135 members and guests in the cafeteria of General Motors Institute, preceded the technical session held in the auditorium and the coffee talk given by D. T. Peden, Chief Research Engineer, Micromatic Hone Corporation, Detroit. Using as his topic, "Honing For Surface Finish," Mr. Peden briefly summarized the history and development of micro-honing.

"Information, Please!" Makes Hit

Kansas City, Mo.—An innovation entitled "Information, Please!" was inaugurated by First Vice Chairman James E. Bell, Jr., when Kansas City Chapter met May 2 at the Blue Bird Cafeteria. The round table, manned by five members who answered questions on grinding problems, proved so successful that it was unanimously agreed to continue such forums with Education Chairman Fred N. Epperson handling arrangements.

W. S. Black, Plastics Dept., E. I. duPont deNemours & Company, Chicago, was the featured speaker, discussing "Plastics In General." He reviewed the history of experiments in plastics, explaining the processes for making the many plastic products which he had on display and demonstrating the strength of nylon thread. Mr. Black answered many questions from the floor, following the conclusion of his formal address.

* * *

Thoroughly conversant with his subject, C. A. Page, Gage Engineer, Pratt & Whitney Div., Niles-Bement-Pond Company, W. Hartford, Conn., told 85 members and guests about "Modern Gage Practice," at the April 4 meeting. An able speaker, Mr. Page explained production gaging machines and their various applications, using slide illustrations.

William S. Jack, Cleveland industrialist, addressing Cleveland Chapter at the Jack & Heintz plant April 13. A banquet and tour of the plant featured the occasion.

Production Pressure Alleviated in England

...tatement of the terrific pressure under which British Tool Engineers and other production workers have labored for the past five and one-half years is indicated in a letter received at ASTE Headquarters from an English correspondent.

Written shortly before the breakthrough to Berlin, the communication from L. H. Rhodes of the engineering firm, S. Carlton Smith, Ltd., Dunstable, England, also comments on the popularity of the American G.I. in his country. We quote:

. . We are all becoming a little War weary over here now after 5½ years of restrictions on practically everything. We are looking forward to the finish in Europe at least in the near future. This alone I think will have quite an uplifting effect as blackout restrictions can then be released, and this is one of the most tedious restrictions during War time. I think to see all our cities lit up again will be a very pleasing sight.

Fortunately for you in the States, you have not been forced to stringent blackout restrictions, so of course you can hardly imagine what it is like in a large city without road lights, and travelling is very difficult.

I cannot tell you much about our work or War production, as I am sure it would not pass the Censor, but although there is a lot of talk about post war production, war time production is still going ahead.

However, we are at least able to breathe a little more freely now as we have been able to catch up with the demand, but right up to 'D' Day top pressure in all phases of production was maintained, and still is in most instances. I wonder how many Executives in America worked on an average from 70 to 80 hours per week all through the War—this was not considered to be anything unusual here.

Some time ago there was a shortage of intoxicants, and this was jokingly put down to the thirst of the American Troops making up for lost time during Prohibition, but for all that your boys are heartily welcome to share with us what we have.

One thing has struck the writer particularly in this War, and that is the popularity of American Troops in comparison with the last War; they seem a different type of men entirely. No doubt this is due to the younger generation growing up and having the advantage of a better standard of living and education. We poor chaps don't get a look in at a dance or social function when the American Troops are about, but we don't begrudge them their good times or any other soldier. . . ."

In an earlier letter, describing the development of mass production of war materiel under the handicap of almost constant bombings, he says: . . . *There is one thing which you have been able to do which has never been possible here until recently, and that is to plan and lay out your shops for the best possible production.*

At one time here the urgency was so great that tools were almost non-existent and we had to make all our War products practically by hand methods. This may appear a rather crude and impossible manner in which to start production, but we can assure you that in 1940 the demand for weapons of War was so great that it was a matter of life or death to get production out in the minimum possible time by whatever means possible.

We have travelled a long way since those days and, looking back, we wonder how it was possible to produce what we did under the conditions then prevailing, not to mention such things as being bombed night and day. If you Tooling Engineers in the States put your problems together and take away your tools and add a few bombs you will be in a similar position to ours during the early stages of the War. However, we have caught up with production and are in the happy position of being able to cope with any emergency that may arise. In spite of what you may hear to the contrary, we assure you that there has been no easing up of the war effort here and all available labour is still being conscripted for industry and the services.

We can assure you that if any American cares to come to this Country at the present time he will feel quite at home, and we often wonder ourselves if it is London or New York judging by the amount of American Troops now seen in London.

We all hope that the War in Europe will soon be over; then we shall be going over to the other side of the world to help you finish up there.

Carbide Tool Grinding

Bridgeport, Conn.—Dinner at the Algonquin Club preceded the April 4 meeting and technical session attended by 67 members and guests of Fairfield County Chapter.

Participating in the technical program were Messrs. Van Riper, Larson and Nowell, Abrasive Engineers from Norton Company, Worcester, Mass.

Mr. Van Riper spoke on "Diamond Wheels—Abrasive Wheel Markings and Their Various Applications," after which a sound-color film was presented, showing the grinding of carbide single point and multiple tools. At the conclusion of their presentation, the speakers answered many questions from the floor.

Among the guests was Director Frank W. Curtis who briefly reviewed current National Society activities.

Engineering Education Promoted

Elmira, N. Y.—Devoted to tool engineering education, under the direction of Education Chairman Varner T. MacRorie, the April 2 meeting of Elmira Chapter attracted an attendance of some 200 members and guests, including local executives and educators.

National Education Chairman Otto W. Winter held the rapt attention of his audience throughout his address, "The Efforts of the National Organization to Promote and Guide the Education of the Tool Engineer."

Now reaching fruition are the long-continued endeavors of his committee to interest colleges and universities in offering degree courses in Tool Engineering comparable with those available in other phases of technical specialization. Listing seven subjects in which the modern Tool Engineer should be well versed and an additional three with which he should be familiar, Mr. Winter emphasized that the Tool Engineer needs not only fundamental, formal training, but also a full practical experience.

In his smiling and witty manner, William F. Patterson, Director, Apprentice-Training Service, WMC, Washington, D. C., presented a dynamic discussion, "Only Apprenticeship Builds Craftsmen." While apprentice training is still behind schedule for even the normal replacement of skilled workers retired by age, the returning veteran through the G. I. Bill of Rights, has an opportunity to enter his chosen field by apprenticeship. This program is a real challenge to ASTE for assistance and guidance, as apprenticeship is the link between the Tool Engineer and the production line.

Concluding this outstanding program were two technicolor sound films, "Fortresses of the Sky," showing the building of the giant Boeing bombers, and "Tank Destroyers," depicting the training of a tank destroyer crew at Camp Hood, Texas.

Guests included Dr. Oscar F. Kerlin, Supt. of Schools, Elmira; Dr. Lynn A. Emerson, Asst. Dean of Engineering Schools, Cornell University, Ithaca, and Director of E.S. and M.W.T. programs; George L. Green, Area Supervisor, Apprentice-Training Service, Syracuse; and John J. Sandler, N. Y. State Apprenticeship Council, Albany, as well as many management representatives of industries throughout the Southern Tier, and ASTE members from Binghamton, Rochester, Toledo and Allentown.

Guests and speakers at the education session sponsored by Elmira Chapter (left to right): Dr. Lynn A. Emerson, Cornell University, Director of E.S. and M.W.T. Programs; Dr. Oscar F. Kerlin, Supt. of Schools, Elmira, N. Y.; George L. Green, District Rep., Apprenticeship-Training Service, Syracuse, N. Y.; George N. Morceau, Chapter Chairman; William F. Patterson, Director Apprentice Training Service, War Manpower Commission, Washington, D. C.; Otto W. Winter, National Chairman Education Committee, ASTE; John J. Sandler, N. Y. State Apprenticeship Council, Albany.

Detroit Free Press Photo

Conclusion of government operations at the Ford Willow Run bomber plant is discussed by (seated, left to right): J. E. Adams, Chief of Contract Termination Control, WPB; Lt. Col. John A. Thompson, AAF Plant Rep., Willow Run Bomber Plant; Walter F. Wagner, Assistant General Superintendent of the plant; (standing): E. T. Raney, Detroit Area Deputy Director, WMC; and Brendon Sexton, head of Local 50, UAW (CIO).

Lost Wax Precision Casting to Expand

New Haven, Conn.—Approximately 200 members and guests of New Haven Chapter met at the Sterling Laboratory April 12, following dinner at George and Harry's Restaurant.

Lewis S. Bergen, President of Bergen Precision Castings, Inc., Pleasantville, N.Y., in a talk on "Precision Castings By the Lost Wax Method," indicated that this method has been known and used in limited applications for many years, until the impetus of war production brought about its development on a large scale.

While the process is still in its infancy, the speaker predicted that in a few years it would become a great industry. Both ferrous and non-ferrous alloys can be cast in this manner, he stated.

"X-Ray In Metal Industry"

Rockford, Ill.—Detection of cavities, tears, cracks and blow holes in metals or metal parts, through the use of X-ray units was explained by R. W. Mayer, Manager of Industrial Sales, Kelley-Koett Manufacturing Company, Covington, Ky., at the April 5 dinner meeting held in Hotel Faust by Rockford Chapter. Slides illustrated X-rayed parts and various X-ray machines.

A University of Pennsylvania graduate in Chemical Engineering, Mr. Mayer is an active member of the American Society for Testing Materials and the American Industrial Radium and X-ray Society.

Member W. Z. Fidler entertained during the coffee period with an exhibition and description of his hobby, "Pocket Tricks and Puzzle Problems."

Music on the vibra-harp and organ chimes was furnished during dinner by Mr. and Mrs. Gail Fletcher.

Wagner Participates In Willow Run Parley

Detroit—Walter F. Wagner, Assistant General Superintendent of the Ford Motor Company's Willow Run bomber plant, took part in the conference which preceded the announcement that the Army Air Forces would halt B-24 production at the plant by the end of June.

Mr. Wagner, a past president and charter member of ASTE, has been an executive at Willow Run since April, 1942. He was there during the heyday of production and saw the plant turn out more than 8,000 four-engined bombers, many at the rate of one an hour.

Prior to his connection with the executive staff at Willow Run, Mr. Wagner joined Ford as master mechanic at the Lincoln Plant when the company purchased it several years ago.

A Tool Engineer since 1912, he held posts in several automobile plants during the next 10 years, before becoming associated with Cadillac Motor Car Company as Chief Tool Designer on the Liberty motor.

Mass Production Applied to Aircraft

Erie, Pa.—Dinner was served to 41 members and 27 guests of Erie Chapter, attending the April 3 meeting at the General Electric Community Center.

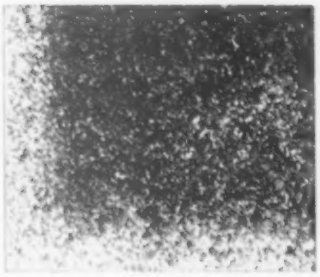
Guest speaker was Peter Rossman who talked on the application of mass production technique to aircraft manufacturing, illustrating his lecture with slides.

During the social hour, Michael Cannarinno, a local magician, entertained with sleight-of-hand and card tricks.

Viewed from beneath the wing of one of its completed Liberators is a section of the huge 67-acre plant at Willow Run which has established a speed record in turning out 4-engined bombers. Capitulation of Germany resulting in early end of production makes future use of the immense building problematical.

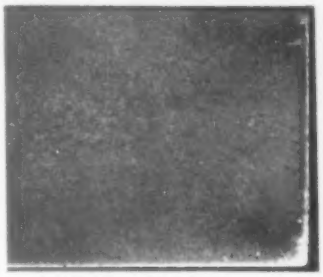
NO-CARB

For the prevention of carburization or decarburization. Applied by brushing or spraying on clean metal surfaces. It is not recommended for threaded work nor is it designed for use in salt baths. Especially suitable for protecting the surfaces of high speed steel tools hardened from furnaces with or without atmospheric control.



NO-KASE

For selective carburization in liquid baths. Provides positive protection against carburization on areas that have been brushed or sprayed with it. Particularly advantageous where such difficult sections as threads are to be protected against liquid carburization. Can also be used successfully in gas or compound carburizing.



NO-TRIDE

For selective nitriding in ammonia atmospheres. An easy to mix, quick drying liquid paint; easily removed after nitriding by wiping or brushing.

NO-SCALE

For the prevention of excessive scaling on steel. A paste of brushing consistency for use on high alloy steels, die blocks and forgings. Acts as a die lubricant and prevents the loss of valuable alloys during heating operations. It is also used on the outside of pressed steel pots to prevent excessive oxidation. May be brushed or sprayed. Removed by mechanical working.

CARBON PREVENTER

For the prevention of carbon penetration into steel. Used on threaded sections or other locations where No-Carb would be difficult to apply or remove. Not designed for use in salt baths.

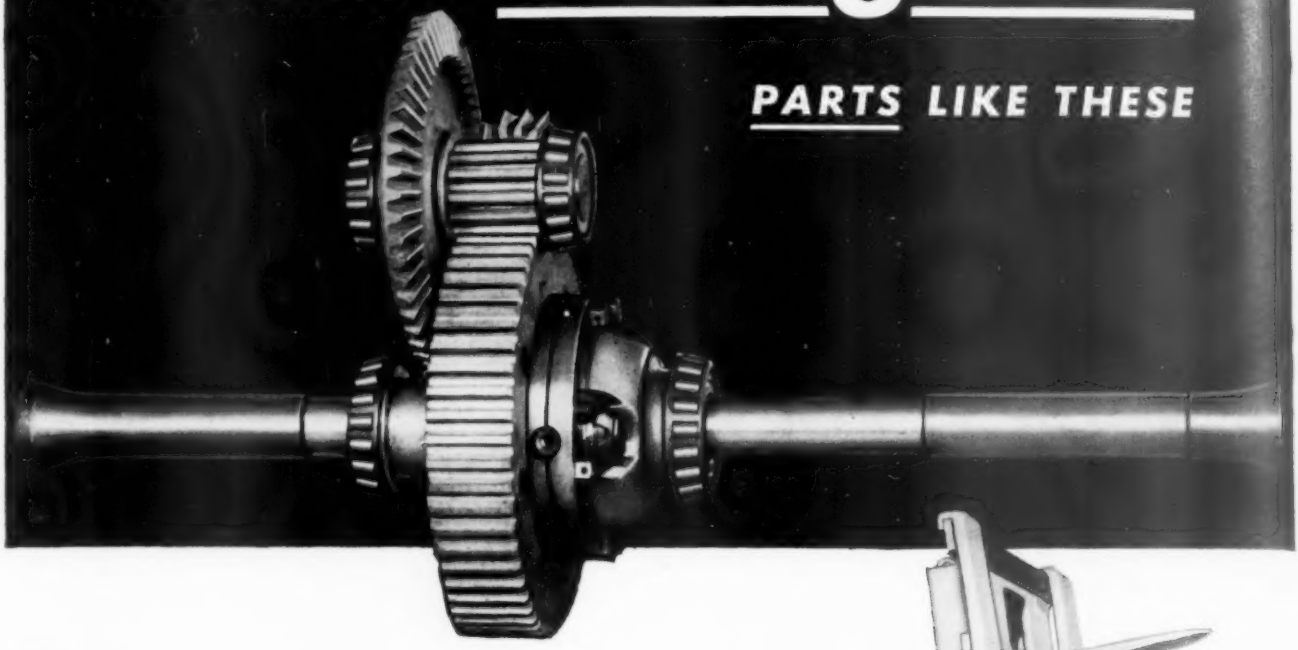
Park

PARK CHEMICAL CO.
DETROIT . . . MICHIGAN

Liquid and Solid Carburizers • Cyanide, Neutral and High Speed Steel Salts • Coke Lead Pot Carbon • Charcoal • No Carb • Carbon Preventer • Quenching and Tempering Oils • Drawing Salts • Metal Cleaners • Kold-Grip Polishing Wheel Cement

8074 MILITARY AVE. DETROIT 4, MICH.

NICKEL ALLOY STEELS Strengthen PARTS LIKE THESE

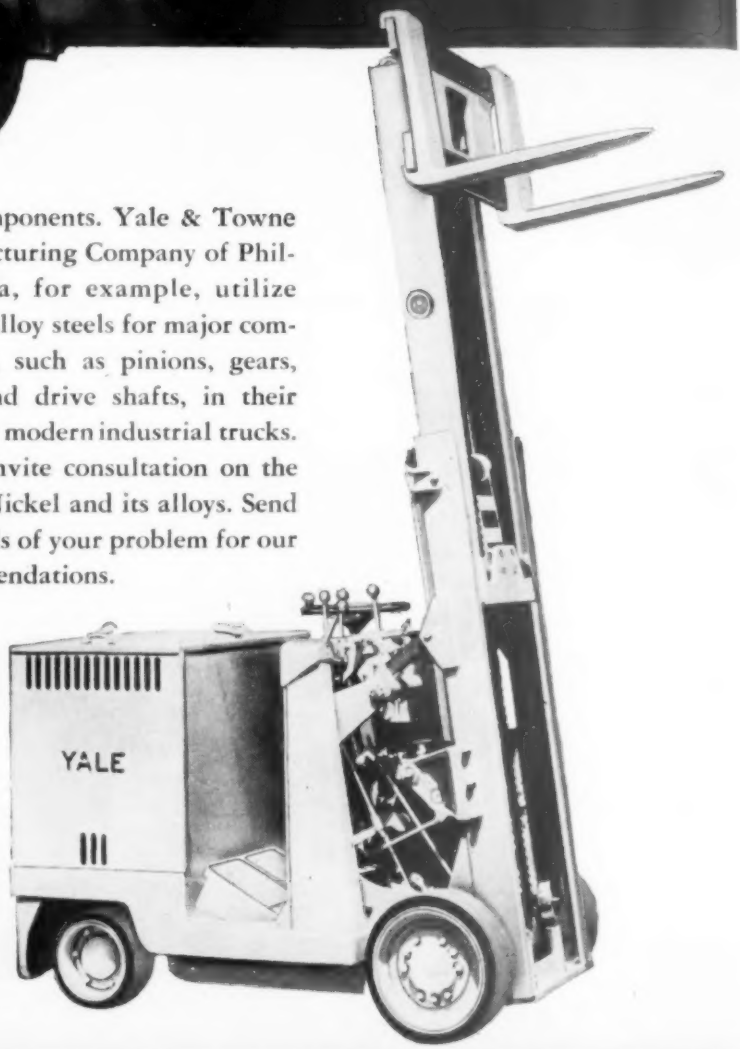


Strength of steel may be increased by additions of Nickel... without sacrificing ductility... but that's not the whole story.

Nickel additions improve toughness and promote depth hardening in heavy sections. In addition, Nickel intensifies the effect of other alloy elements.

Alloy steels fortified by Nickel have proved reliable for automotive components. Yale & Towne Manufacturing Company of Philadelphia, for example, utilize Nickel alloy steels for major components, such as pinions, gears, axles and drive shafts, in their compact modern industrial trucks.

We invite consultation on the use of Nickel and its alloys. Send us details of your problem for our recommendations.

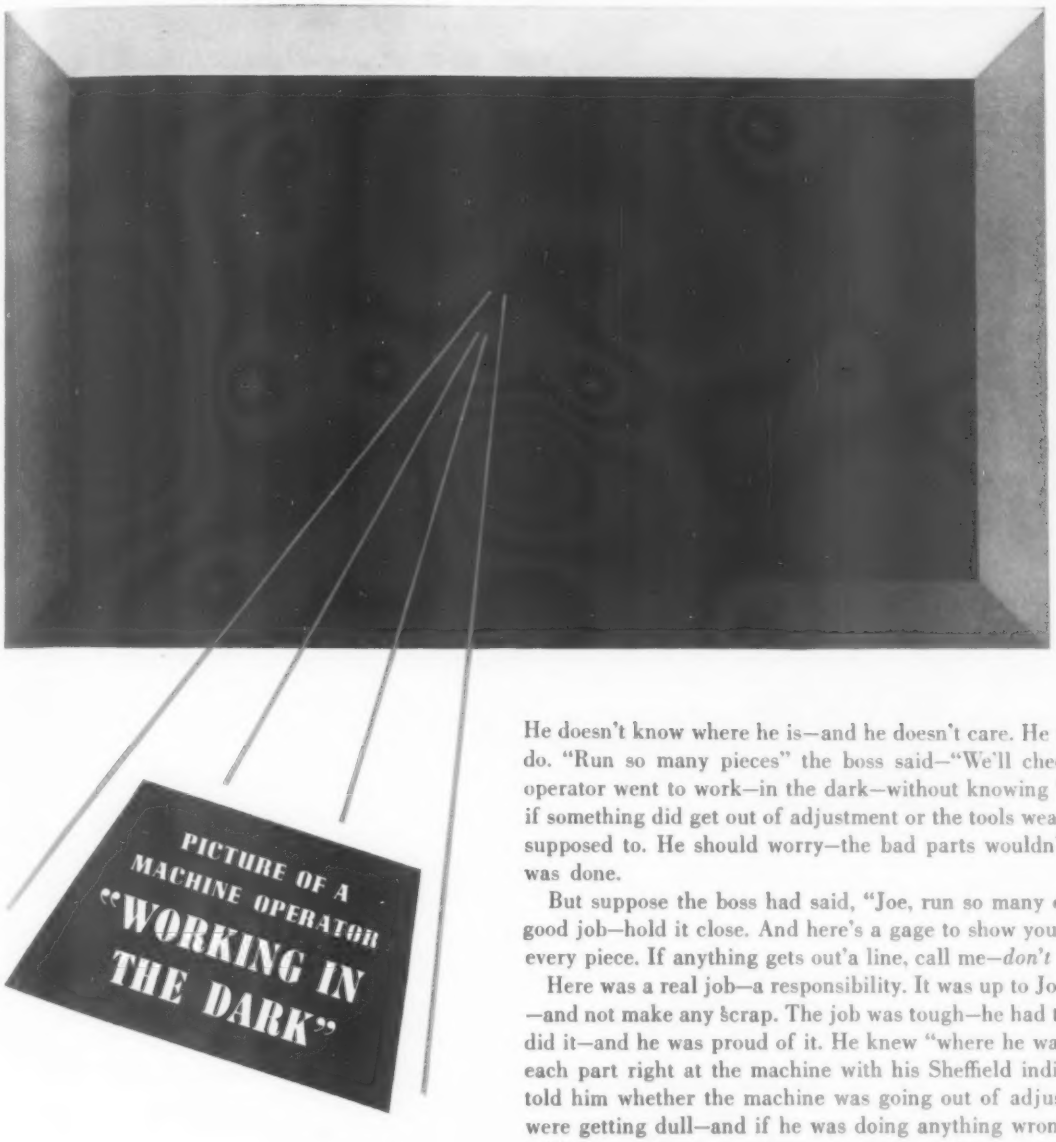


● This modern high-lift Yale truck can deftly pick up and transport 10,000 lb. skid-loads... and raise the full 5 tons through a standard range of 60 inches.

Edison Nickel-iron alkaline storage batteries provide a rugged, light-weight power source in many of these trucks. Nickel in the positive elements and Nickel plated steel parts throughout the battery contribute to its long dependable service.

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N.Y.

HE *Doesn't know* WHERE HE IS!



He doesn't know where he is—and he doesn't care. He was given just a job to do. "Run so many pieces" the boss said—"We'll check 'em later!" So the operator went to work—in the dark—without knowing "where he was." What if something did get out of adjustment or the tools wear faster than they were supposed to. He should worry—the bad parts wouldn't show up till the job was done.

But suppose the boss had said, "Joe, run so many of this. It's got to be a good job—hold it close. And here's a gage to show you where you are. Check every piece. If anything gets out'a line, call me—*don't run scrap!*"

Here was a real job—a responsibility. It was up to Joe to make GOOD parts—and not make any scrap. The job was tough—he had to hold it close. But Joe did it—and he was proud of it. He knew "where he was" because he checked each part right at the machine with his Sheffield indicating gage. The gage told him whether the machine was going out of adjustment—when the tools were getting dull—and if he was doing anything wrong.

If your jobs are tough—and scrap is piling up -because your operators are "working in the dark", CHEK WITH SHEFFIELD.

Write for Engineering Data or a demonstration in your plant of Sheffield Visual Gages • Precisionaires • Airsnaps • Electrigages • Dial Indicator Snaps and Thread Checking Instruments. "THERE'S A SHEFFIELD INSTRUMENT FOR EVERY GAGING APPLICATION."

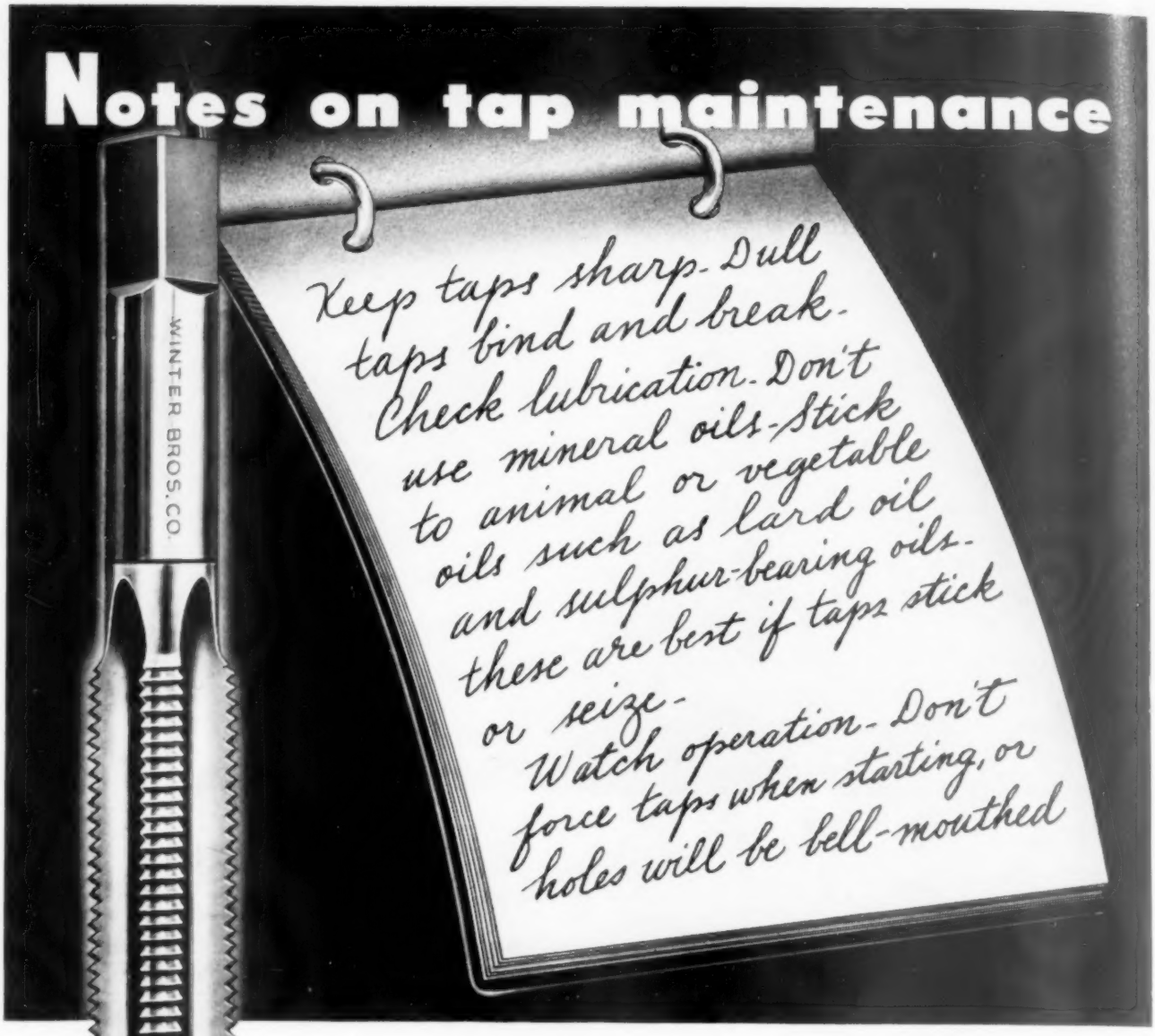
THE SHEFFIELD CORPORATION

Dayton 1, Ohio, U.S.A.

SHEFFIELD MASTER CRAFTSMEN

MACHINE TOOLS • GAGES • MEASURING INSTRUMENTS • CONTRACT SERVICES

Notes on tap maintenance



Precision tools, like TAPS, call for particular care because of the nature of their cutting edges. They should be handled gently to avoid broken teeth. Regrinding should be done by experienced operators, as variations in uniformity of the cutting lands and teeth will produce poor threads, and shorten the life of the Tool.

Winter Brothers
COMPANY Wrentham, Massachusetts, U.S.A.

WENDT-SONIS

the most complete line of

STANDARD CARBIDE TIPPED CUTTING TOOLS

W-S STANDARD REAMER WITH CARBIDE TIPS . . . Straight or tapered shanks. Sizes ¼" to 1½" diameter. Also Jobber, Right Hand Spiral and Left Hand Spiral Styles.

W-S CARBIDE TIPPED SHELL END MILLS . . . Excellent long-life tool. Sizes from 1¼" to 6" in diameter. New design for machining steel.

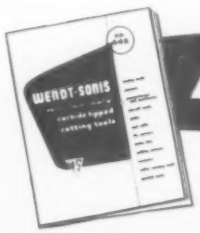
W-S CARBIDE TIPPED LATHE CENTERS . . . Styles for both turning and grinding. Concentricity guaranteed to within .0002". Morse, Brown & Sharpe and Jarno tapers.

The Wendt-Sonis line is complete . . . you will find it to contain a wide range of standard sizes and types.

The Wendt-Sonis line is standard . . . this means uniform quality . . . rapid service from complete distributor and factory stocks.

Wendt-Sonis produces cemented, carbide tipped cutting tools exclusively . . . this assures a high standard of perfection.

There's longer life between sharpenings in the Wendt-Sonis line . . . the marked preference of tool engineers for W-S tools is evidence of this.



FREE! new cutting tool catalog 445

Write Wendt-Sonis Company, Hannibal, Missouri. Contains specifications and latest prices on all these carbide tipped tools:

REAMERS • END MILLS • LATHE CENTERS • SPIRAL REAMERS • BORING TOOLS • STUB SPOT FACERS • SLOTTING CUTTERS • COUNTERBORES and SPOT FACERS • END MILLS • FLY CUTTERS • CORE DRILLS • ROLLER TURNING TOOLS • SPIRAL END MILLS • GRINDER HALF CENTERS • CUT-OFF TOOLS • TWIST DRILLS

THE PATENTED

LEMPCO

DUAL-SPIRAL EXPANSION REAMER

FINISH-REAMS MORE HOLES PER MAN-MINUTE!

Left-hand flutes on two blades spiral in a direction opposed to the right-hand flutes on the third blade simultaneously. This construction effects a sharp, clean, shearing action that produces satin-smooth finishes to close tolerances. 500% greater expansion range, in combination with blades that can be resharpened 8 to 10 times, multiplies life of the Lempco Reamer many times that of an ordinary reamer. Ideal for reaming smoothly over split bushings, oil grooves, keyways, etc. Straight line expansion from .035″ to .080″. For all machinable alloys and plastics. Write for details.

WRITE FOR CATALOG

LEMPCO

5496 DUNHAM RD. • BEDFORD, OHIO, U. S. A.

Here you'll find

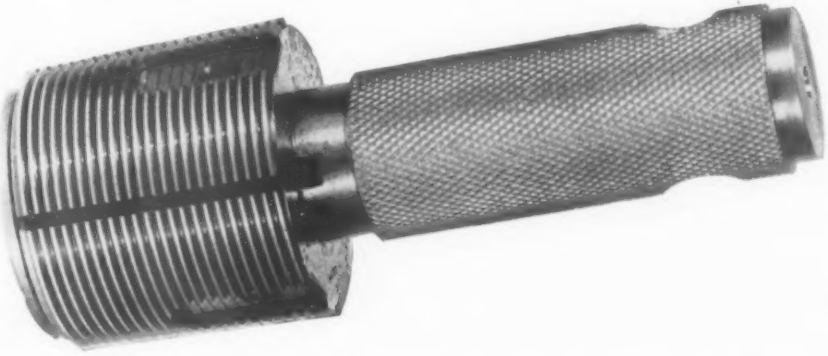
ACCURACY...

The privilege of imprinting the API monogram on gages, signifying conformance with American Petroleum Institute standards of precision, is not freely or loosely granted.

The Pipe Machinery Company has proudly enjoyed that permission for many years.

You can always rely on the sustained accuracy and perfection of finish of any gage that carries the PM Diamond Emblem.

MASTER GAGES, checked by the National Bureau of Standards, maintained in all important petroleum areas and by pipe and tubing manufacturers, enable the industry to achieve an unusual degree of sustained accuracy. API standards of thread precision are considered the most exacting required in volume production, and the plan for maintaining these standards is without competition in excellence.



Special Gages, made to your specifications, will be quoted on request. Large stocks of standard Plug, Ring and Thread Gages are ready for immediate shipment.

ARMY E NAVY

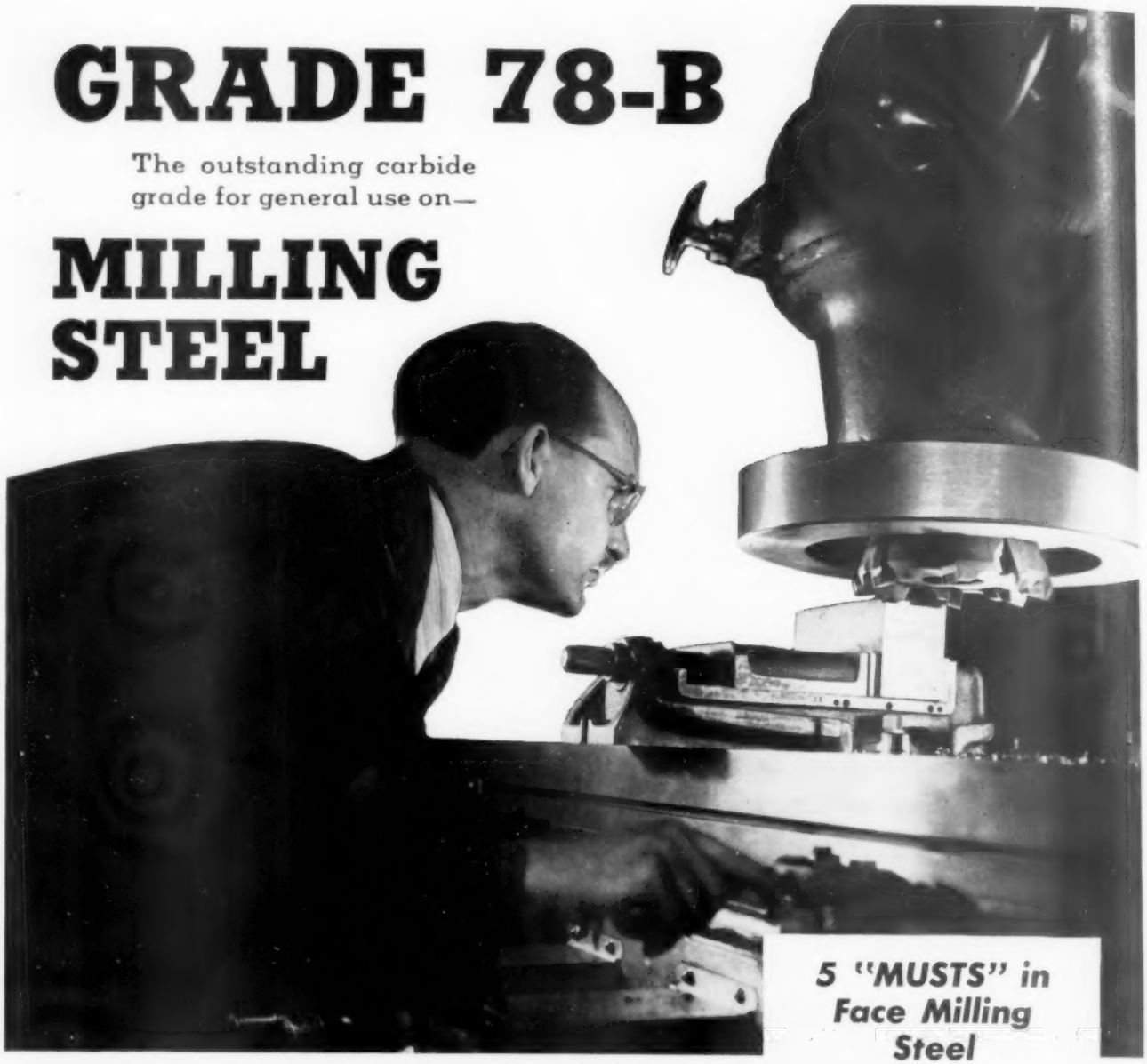
The PIPE MACHINERY COMPANY Cleveland, O.

GAGES • MULTIPLE THREAD MILLING CUTTERS • SPECIAL TOOLS

GRADE 78-B

The outstanding carbide grade for general use on—

MILLING STEEL



5 "MUSTS" in Face Milling Steel

1. No. of teeth should not exceed No. of inches in cutter diameter.
2. Grinding is vital. Use recommended method.
3. Use a flywheel.
4. Use negative rakes.
5. Position work in relation to cutter so cutting edge enters at negative angle.

Send for these technical manuals: GT-127 (Grinding), GT-174 (Application).

For general, all-around use on the milling of steel, you'll find Carboloy Grade 78-B outstanding in performance. Highly resistant to edge wear and cratering—and with the toughness to withstand severe cutting conditions, Grade 78-B takes all commonly used steels "in its stride". It plows through heavy cuts, or skims along on light finishing for prolonged periods of continuous use between sharpenings.

With cutters in your crib equipped with Grade 78-B, you're prepared to "tool-up" *immediately* with the right carbide grade for most current jobs—ready to "GO" on a wide range of steel milling applications.

Try Grade 78-B—the universal grade for steel milling—today!

CARBOLOY COMPANY, INC.

11124 E. 8 MILE BLVD. . . . DETROIT 32, MICHIGAN

CHICAGO • CLEVELAND • HOUSTON • LOS ANGELES • MILWAUKEE • NEWARK
PHILADELPHIA • PITTSBURGH • THOMASTON

Also Sold by Leading Mill Supply Distributors

CARBOLOY

CEMENTED CARBIDES

RIGHT... down the line in types and sizes

You'll find all types and sizes of Bay State Grinding Wheels for all types of work ... RIGHT, down the line. Centerless grinding, cylindrical grinding, disc grinding, internal grinding, snagging, cutting-off, etc. . . . Sizes, shapes, bonds, grades, grains, and structures to meet specific requirements right.

And once you have determined on a type and size that suit your job right, you can expect to get the very same qualities on repeat orders. "Top performance, consistently duplicated" results from extremely close control over materials and manufacturing processes plus such Bay State features as

"Fractional Grades"— 3 degrees of hardness within every grade; developed to permit a closer fit of grit to grind.

"Controlled Porosity" — a precise method of spacing cutting units which not only makes closer selection possible but also exact duplication.

Such a combination of features are your assurance of getting grinding wheels that are RIGHT — down the line. So whatever your needs for grinding wheels, look into the advantages offered by Bay State's complete line. Write for bulletin to get additional facts.

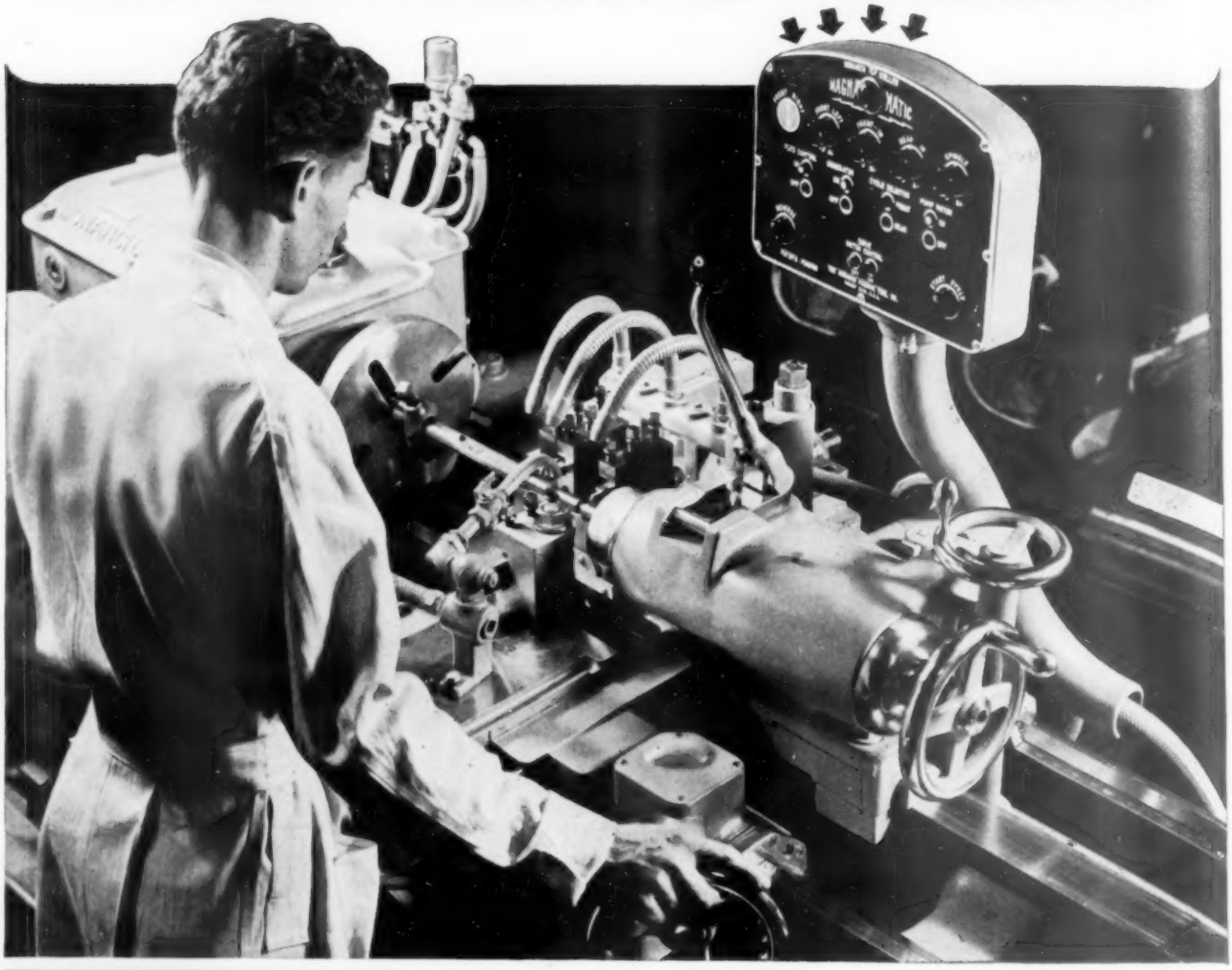
BAY STATE ABRASIVE PRODUCTS CO.

9 Union Street, Westboro, Mass.

ABRASIVE PRODUCTS

GRINDING WHEELS · HONING AND SUPERFINISHING STONES · PORTABLE SNAGGING WHEELS
MOUNTED WHEELS · AND POINTS · CUT-OFF WHEELS · INSERTED-NUT DISCS · AND CYLINDERS

JUST A TWIST OF THE WRIST CONTROLS THE MONARCH MAGNAMATIC



Controls on the Monarch Magnamatic are concentrated within arm's length for fast setup and easy operation of this modern double carriage, all-electrically controlled turning machine.

Handwheels with micrometer adjustments permit quick setups for economical turning even of short runs. Start-cycle button on panel controls the operating cycle. Electric controls permit automatic selection of six different feed rates for maximum metal removal or for different finishes on various portions of the work.

The Monarch Magnamatic has 10 years of successful performance on peace and war work. Marked advancement in electrical controls has permitted us to improve even its previous satisfactory operation.

For automatic or semiautomatic operation on short or long runs, the Monarch Magnamatic will more than pay its way by reducing costs on a wide variety of turning, boring or facing work. Ask for detailed information.

THE MONARCH MACHINE TOOL COMPANY • SIDNEY, OHIO

622 West Washington Blvd., Chicago 6, Ill.
801 Fisher Bldg., Detroit 2, Mich.

FACTORY BRANCHES:
10465 Carnegie Ave., Cleveland 6, Ohio
635 Industrial Office Bldg., Newark 2, N. J.
Representatives in principal cities.

512 Empire Bldg., Pittsburgh 22, Pa.
38th and College Ave., Indianapolis, Ind.

For your information:

Engineering Data *on* Precision Broaching Tools

YOU will want this Brochure because it contains technical information about broaching tools plus a picture story (in natural color) showing how they are manufactured. If you are planning for post-war production it will more than pay you to send for your free copy today. Please make request on your company stationery.

REMEMBER: Broaching is the fastest metal cutting process that roughs and finishes to precision limits.

U.S. BROACH Company

USB

6468 E. SEVEN MILE ROAD DETROIT 12, MICH.

BROACHING TOOL

TELEPHONE TWINBROOK 1-2211

Universal Floating Chucks for vertical and for horizontal operation

Left: Universal Floating Chuck Type T for vertical operation. Above: Universal Floating Chuck Type F for horizontal operation.

The unique, rugged design of Universal Floating Collet Chucks speeds up production (F type for horizontal and T type for vertical) of drilling, reaming, and counterboring operations.

The type F for horizontal use in an automatic screw machine or turret lathe, has adjustable spring pressure for tool weight compensation. Thus, the work can be approached at high speed without the danger of marring or causing bell-mouthed conditions.

For vertical operation, as in a drill press, the Universal Floating Collet Chuck Type T is self-centering and permits tension adjustment through the taper shank with an Allen Wrench. It is adaptable for reaming and for counterboring where piloting or following the previously drilled hole is desired.

Both types use ball bearing float. Write for full information on Universal Floating Chucks or any of the other fine Universal products illustrated here.

UNIVERSAL TOOLS THAT WILL INCREASE PRODUCTION AND ACCURACY IN YOUR PLANT

UNIVERSAL ENGINEERING COMPANY

FRANKENMUTH, MICHIGAN — Fighter Plane Given by Employees — 20% Employee Bond Deductions

TOOLS OF TODAY

Grinding Wheel Crush Dresser—Internal Measuring Instrument

Two New Products—an electrically powered crush dressing device for grinding wheels, and an internal measuring instrument—are announced by *The Sheffield Corporation*. The first is designed to form the wheels on Sheffield precision thread and form grinders, and is available in two styles, either of which can be applied to current or new Sheffield machines.

FIG. 1. Sheffield crush dresser, model A, manually controlled.

With Model A, shown in Fig. 1, the crusher is manually lowered into contact with the wheel, which revolves at grinding speed. The operator then pushes a button, when the crusher roll is power fed at a constant rate, under a coolant flow, until the desired depth of dressing, as shown by the indicator is obtained. The operator then releases pressure on the button, thereby stopping the wheel, crusher in-feed and coolant flow. The crusher is then lifted out of engagement, when grinding of the work continues.

Model B dresser is semi-automatic, the feed dial indicator being pre-set for a desired depth of automatic in-feed of the crusher roll. Removing the wheel guard and lowering the crusher roll into contact with the wheel, and then closing an electric switch, starts the cycle of coolant flow, crushing wheel speed, and feed of the crusher into the wheel. At the depth set on the dial indicator, action ceases, as with Model A, and the operator returns the crusher roll to the upper position, when grinding of work is resumed.

Saves 50% Time

While either model has many advantages over manual crushing, Model B has the additional advantage of keeping the amount of stock removed from the wheel at a minimum, due to eliminating the human element. With either model, wheel dressing time is reduced by at least 50 per cent, with increased life of crusher roll due to uniformity of operation and smoothness of in-feed.

The other new product—a new Model N-5 Internal Measuring Instrument—embodies both mechanical and electrical principles and is sometimes referred to as the "hole checker." A comparator type instrument for the precision measuring of internal dimensions, it is equipped with an electric gaging head known as the Electrigage, a 2500 to 1 amplifying device jointly developed by Sheffield and Westinghouse research engineers. Other amplifications may be had on order.

There is no lag, since a new type of electrical magnification results in instantaneous action of the indicator hand, thus giving quick, positive reading. The stylus has a feather touch, so that gaging pressure never exceeds 3 ounces. Zero setting is by means of a fine adjustment knob, and an automatic stabilizer precludes ordinary voltage variations from affecting the accuracy of readings.

The N-5 may be used as a bench instrument in receiving inspection, or in the toolroom or gage laboratory for checking master and working ring gages, tools and precision work having one or more internal dimensions. Precision gage or master blocks are used as references, while a limit switch, operating two red signal lights, aids the operator in setting up and properly positioning the work for checking.

Wide Range of Capacities

Range includes minimum and maximum diameters of .370" and 12", respectively. One may explore a hole 3" deep for diameter, taper, bell mouth or out-of-round condition, with capacity sufficient to accommodate an A.G.D. ring of the largest diameter. The instrument can also be supplied with special gaging arms for checking holes down to and including .240" diameter, where the maximum forging depth is 1 inch.

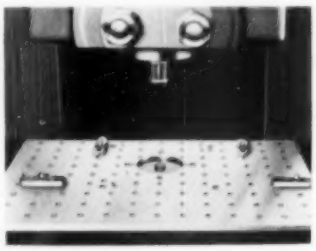
Built for accurate checking, all critical and exposed parts are chrome plated for longer life, with contact points Tungsten carbide tipped to minimize wear. The linear scale, of balanced type, has a total range of .0012". Distance between the smallest graduations (representing .00005"), is about ⅛", so that interpolation to .000025" or less is easily accomplished.

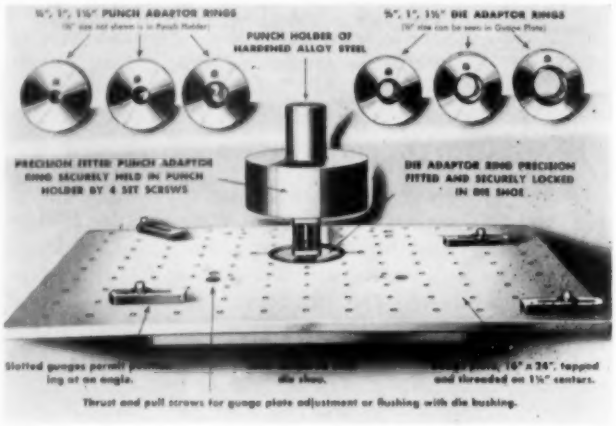
Full information on both of these Sheffield devices may be had by writing the manufacturer at Dayton 1, Ohio.

FIG. 2. New Sheffield model N-5 internal measuring instrument.

Single Hole Perforators

A NEW LINE of equipment, for Single Hole Perforating, is being manufactured and marketed by *S. B. Whistler and Sons, Inc.*, 752-6 Military Road, Buffalo, N.Y. The complete outfit, which is designed to reduce perforating costs of holes from 1/32" to 1½", consists of the following: A hardened, alloy steel punch holder, four each hardened and ground punch adapter rings and die adapter rings in range from 1/32" to 1½", a semi-tempered steel die shoe, a 16" x 24" gage plate and four gages for positioning sheet to be perforated.





Punches, dies and strippers are not included. These parts, in standard sizes and shapes as commonly used with Whistler adjustable die units, can usually be supplied in a few days, however. These perforators will work on materials up to ¼" thick mild steel with extreme precision. Complete details, with illustrations, parts list and prices are contained in Whistler catalogs which may be had on request from the manufacturer.

Plastic Collet Plug Gages

CLAIMING one of the most important improvements in cylindrical plug gages in recent years, *United Precision Products Co.*, 3524 W. Belmont Ave., Chicago 18, now replaces conventional metal collets with light, yet tough and durable colored plastic collets. Because green designates "Go" and red "No Go", the user has instant information regarding the plug to be used.

This, however, is only one of the advantages claimed. Because the plastic grips the plug much more securely, it has been found superior to metal in every way. The plug cannot be twisted out by vise or wrench, hence, there is no slipping. However, it is easily removed with a drift. Weight is reduced, effecting a better balance, while accuracy is preserved since the plastic cannot scratch or mar the plug.

Another advantage is insulation, the plastic collets being dielectric, a protection against electrical effects. Also, they are reversible, with two "Go" and two "No Go" gages in each Dublife handle. When either end becomes worn as eventually happens with all gages, the user need only reverse the plug to have a new gage. The new handle is so designed that either plug can be quickly removed without disturbing the other. Further details may be had by addressing the manufacturer.

Profile Millers

ENGINEERED TO expedite production on aircraft diffuser parts, 3 special profile millers built by *Snyder Tool & Engineering Co.*, 3400 E. Lafayette, Detroit 7, handle three consecutive operations on these parts and entirely eliminate costly hand finishing operations which would otherwise be necessary.

The first machine, a vertical 2-spindle end-miller, mills a 1/32" radius on each end of the nine diffuser vanes. The work-piece is located and clamped on a nine station Geneva index table, and one vane is machined at both ends on each of the 9 individual cycles. The end mills are installed on an eccentrically mounted quill housing which rotates through nearly 180 degrees. This machine is essentially a Snyder 3 V 14 drilling machine, with special equipment, and the 2-spindle head, motor and spindle drive mechanism, supported by guide bars, slide into position hydraulically.

In the 2nd operation (illustrated) the outside contours of the vanes are milled in a vertical single-spindle miller, with side milling cutters set at an angle to the center line of the spindle housing.

In addition to the feeding motions, such as feeding the cutter down, moving the entire slide in and rotating the table at feed rate, it is also necessary to rotate the spindle housing angularly, to correspond to the in-and-out movement of the main slide. This function is performed by the mechanism shown at left of cutter housing. This operation is also completed in nine passes.

A single-spindle, vertical end miller mills the inside contour of the vanes in the 3rd operation. After rapid traverse into the work, the spindle housing is raised, by cam mechanism, to conform to the contour of the vanes. The part is rotated through an arc, at feed rate, with the vertical feeding spindle housing actuated by cam. All three actions—feeding the cutter up and down and in and out, and rotating the part—are mechanically synchronized. As in the previous operations, the fixture is located on a 9-station Geneva index table and the operation is completed in nine passes.

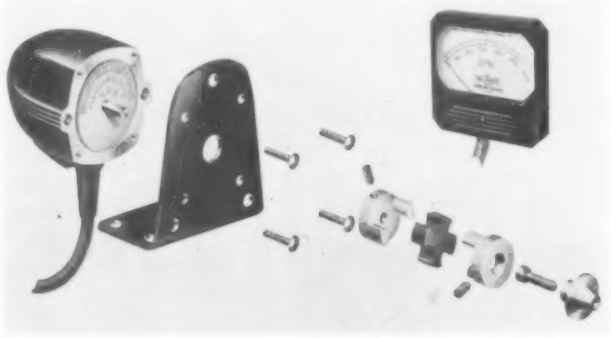
Small Tungsten Carbide Reamers

Because of New manufacturing techniques developed by *Super Tool Company*, Detroit, Mich., solid Tungsten Carbide reamers in sizes as small as .125" are now available to industry. These exceptionally clean cutting, long wearing reamers may even be supplied as small as .09375"; however, while suitable blanks are now available and deliveries favorable, sizes below 1/8" will only be made on special order. These small reamers, with the advantage of higher speeds and longer life afforded by carbides, considerably extend the range of cutting jobs and are available from Super Tool Company's stocks.

Electric Tachometer

Designed to Meet present day demands for controlled machine speeds, a low-cost electric speed indicator, product of *Reliance Electric & Engineering Co.*, Cleveland, Ohio, may be installed as a readily readable unit on practically any machine. In addition to provision for full scale graduations corresponding to 1500, 2000, 2500, 3000 and 5000 RPM, special scales are available in other readings such as feet per minute and process cycles of varying time lengths.

The Reliance Indicator, which gives accurate readings from 100 to 5000 RPM, consists of two units, a pick-up and an indicator. The first, a miniature 6-pole alternator with a permanent magnet rotor, is mounted on the shaft whose speed is to be measured. The indicator, a moving coil type magnet, meters the output of the pick-up on a 3¾" scale which covers 95 degrees of arc.



The resistance of the indicator is sufficiently high so that the size or length of leads connecting the units cannot affect accuracy; as a result, the indicator is not affected by other magnetic material, and accuracy is not impaired by length of service. Pick-up windings are stationary, and there are no commutators or slip rings, nor are any conduits required. Lifetime lubrication further simplifies maintenance. Speed indication is instantaneous and continuous, and independent of the direction of rotation of the shaft.

The indicator makes it possible to establish proper operating speeds in an extremely broad field of application, giving advantages of controlled speeds with lower operating costs and improved quality.

Automatic Drilling Attachment

Designed to be Clamped to any standard drill press column, a self-contained automatic drill press attachment, with capacity ranging from No. 55 to ¼" drills, supplements the line of *The Automatic Drill Press Co.*, 14899 Lesure, Detroit 27. The working and reverse stroke of the spindle is entirely automatic and is set in motion by a foot switch which closes the motor circuit contactor. Motor drive is direct, as shown in the illustration, thereby eliminating belts and gears.

The illustration shows a set-up for drilling two 3/32" holes in a fuse part, both holes being held to close depth tolerances. Because of the foot control, and the entirely automatic control of the spindle, the operator's hands are entirely free for the handling of the part and for loading, unloading and indexing the jig. As a result, operator fatigue is materially lessened, with a commensurate increase in production.

A four page Bulletin, suggesting numerous uses for the tool, may be had on request from the manufacturer.

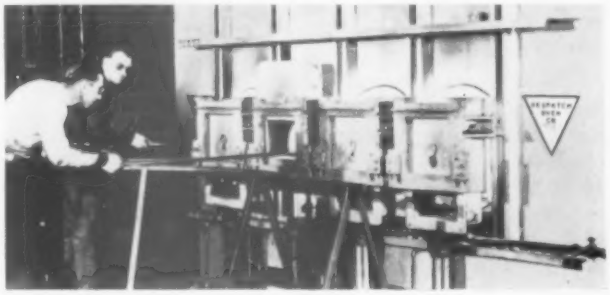
Controlled Atmosphere Furnace

A New Type Despatch controlled atmosphere forging furnace conserves floor space and greatly increases production. As an example, in processing hard steel forgings at 2250 degrees F., the furnace handles over 2300 pieces per day, using nitrogen gas.

Compact and efficient, the furnace utilizes a special four-in-row muffle arrangement, thereby reducing all dimensions to a minimum. Each muffle is 12" dia., with a depth of 36", with overall outside dimensions 12' x 6'. Back-towards-front firing results in uniform heat through the entire 36" depth of the muffles.

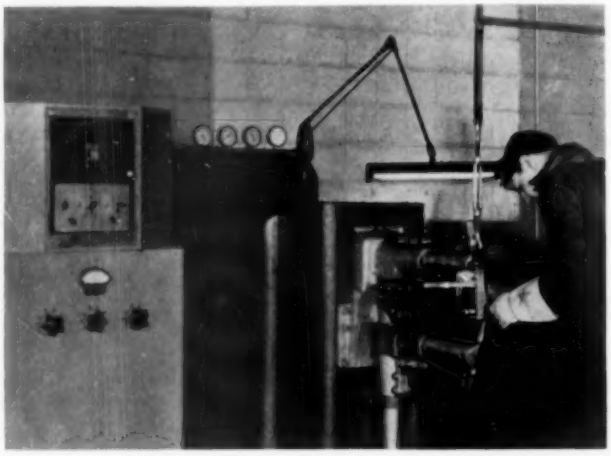
Roomy, convenient level hearths and air-operated doors permit quick removal of forgings and transfer to press handling stations.

Further information on these furnaces, which are available in various sizes, gas or oil fired, may be had from *Despatch Oven Co.*, Minneapolis 14, Minnesota.



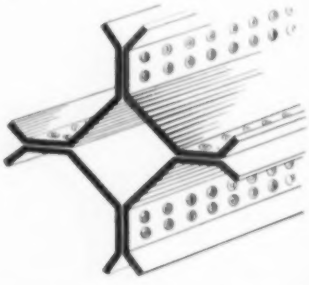
Battery Operated Welders

NEW STORAGE battery operated welders, which do not require special power lines, have recently been announced by *Progressive Welder Company*, Detroit. A number of these machines, as shown in the photograph, are already in action turning out fluted structural steel Naval ordnance sections at a rate of 1440 spot welds per hour. These machines are in operation 20 hours per day.



The machine shown—one of the smaller Progressive models—is primarily designed for plants having a limited amount of power, or less than that required to operate the 150 KVA machines which would be the minimum with conventional welders. It is coupled direct to the 220 volt shop wiring system through a battery charger which has a maximum 3-phase draw of only 26.7 KVA. The parts being welded (⅛" to ⅛" steel) are arc-tacked before coming to the welder, where the output is 6 units per hour, with 240 spot welds in each. In a 20-hour day, this results in 28,800 welds.

After the work is loaded, operation is continuous (automatic repeat) as long as the treadle is depressed. When all spots have been completed on one web, the assembly is flipped 90 degrees, and the next web is welded, and so on until all four are completed. Time for index between spots is about ¼ second, welding time ½ second, and total ¾ second.



The welder itself is of the rocker arm type, with batteries, instead of the conventional transformer, located in the base of the machine, which also houses the air-operated contractor-controller. With this type of contractor, it is the actual welding current, rather than the primary, which is interrupted. The amount of current is controlled by the pressure between two carbon discs in the contactor-controller. When pressure is removed, the current stops flowing; as a result, there is no arcing despite the fact that the welding current is around 20,000 amperes.

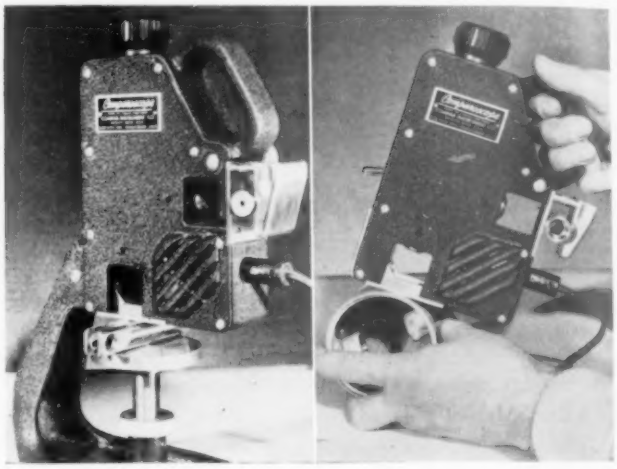
As an unusual feature, no compensation is required for induction losses from the first to the last weld. And, since d.c. is used, the amount of stock in the throat has little effect on welding current. The automatic charger keeps the 12 battery cells charged to a peak draw of 80 amps, 3 phase, and service requirements are mainly confined to periodic adding of water, and occasional point dressing. Full information on these welders may be had from the makers.

The Comparoscope

A PRODUCT of the Compar-Instrument Company, Detroit, this dual comparing microscope provides a new approach toward the comparing and evaluation of surface finishes. The instrument solves the question of determining the exact degree of surface finishes by directly comparing a workpiece with an accepted standard or master.

The Comparoscope contains its own directed light source, and is automatically in focus on both specimens, regardless of their size. Manipulation is extremely simple, and readings are equally clear to the unskilled operator and the trained expert.

A stand, equipped with an adjustable stage, makes the instrument a self-illuminated Shop Microscope by simply moving a slide on the side. This eliminates the image of the master stage and the entire field of vision is available for inspection of tools and specimens placed upon the stage.

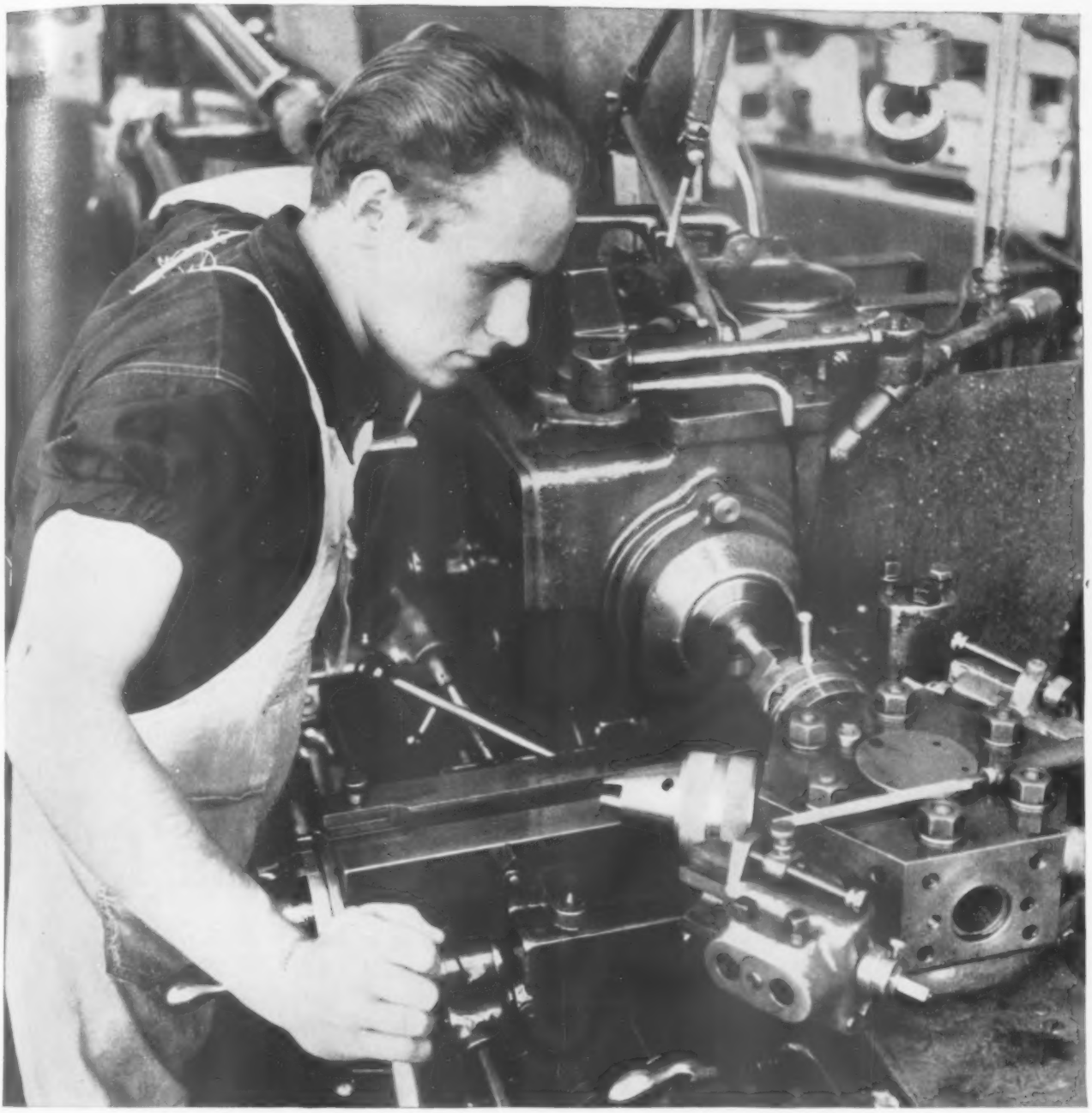


A simple eccentric lock unclamps the instrument from its stand, when it may be used directly on the job—the most logical place to inspect in view of present day demand for precision. The Comparoscope, with its special transformer, is shipped in a case provided with compartments for various specimens. Complete details of this device and suggestion for new methods of "comparison-inspection," may be obtained from the manufacturers.

Magazine Nut Gun

KNOWN as the E-Z ON NUT GUN, a new development by *E.Z. On Company*, 9551 Grand River, Detroit 4, Michigan, facilitates the driving of nuts or studs. The tool is magazine fed, and can be furnished for any size nut and any particular style, such as Castle, Elastic stop, Hexagon, Square, Slotted, Acorn or Cap nut.

A magazine inserted in the handle holds the nuts and delivers one at a time directly onto the stud, while the remaining nuts are held in the magazine. Operation is extremely rapid and an air or electric nut driving unit can be used as the driving medium and torque may be set on the drive to any weight.



LANDMATIC Hardened and Ground or Heat Treated DIE HEADS

Are Used in Turret Lathe Operations in Most Aircraft Plants

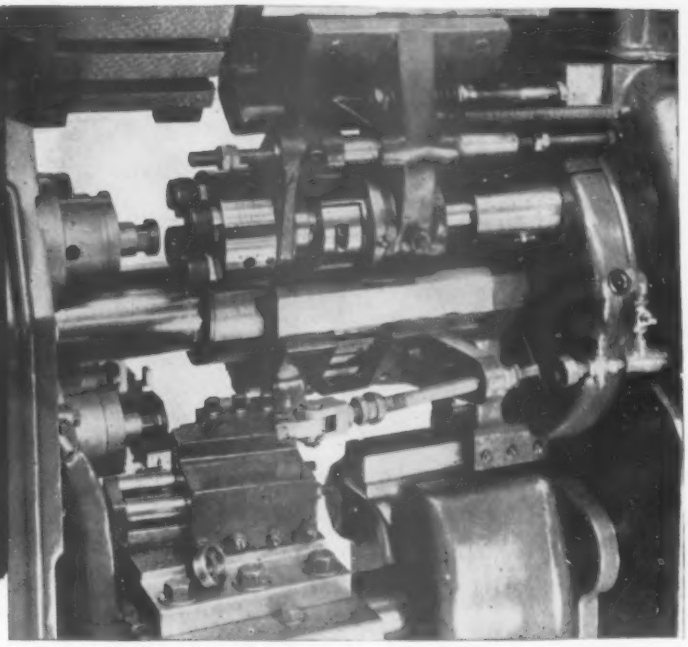
The few operating parts of LANDIS Die Heads and their precise assembly make it possible to produce threads within extremely close tolerances on a high production basis.

Send for Bulletins describing Landmatic Die Heads

LANDIS MACHINE COMPANY, WAYNESBORO, PENNA, U.S.A.

THREAD CUTTING MACHINES • DIE HEADS • COLLAPSIBLE TAPS • THREAD GRINDERS

You can CUT COSTS when you SAVE TIME



Here are both sides of a 4-spindle Acme-Gridley Chucker set up for a malleable iron pipe union, 1½" diameter, 1" long.

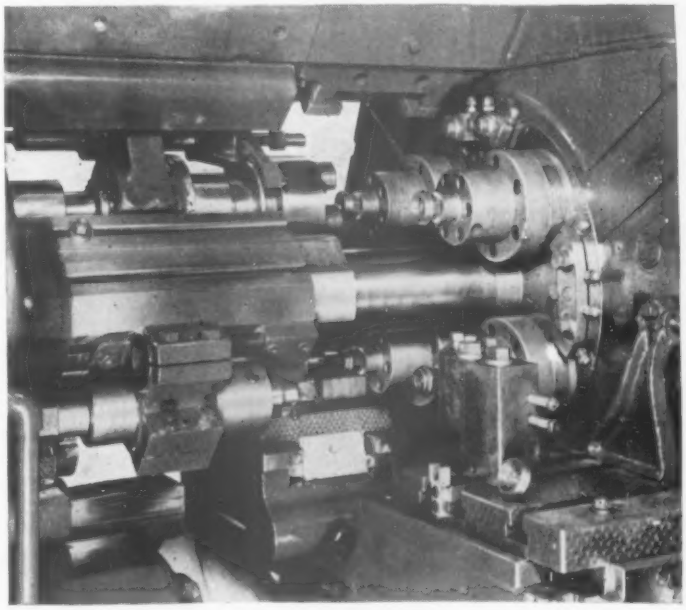
Material costs and labor costs, supervision and overhead, are all fairly constant. The one great variable is TIME.

Do the job faster and you cut the cost of production.

No matter what kind of chucking work you have, the Acme-Gridley Chucking Automatic—4, 6 and 8-spindle—will help you turn it out faster, without any sacrifice of precision.

More tools at work—more operations at the same time—made possible by large, accessible tooling area and independently controlled attachments. Work easy to handle, less operator fatigue.

Many users tell us about cost reductions as high as 50% to 75%, as compared with former methods.

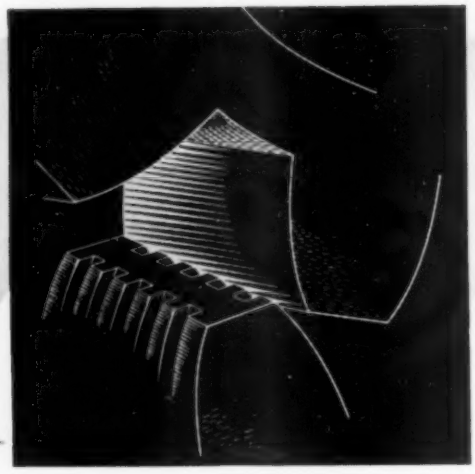


This booklet shows you 25 Chucking Jobs on which money was saved. Some of the parts may be just like those you make. Send—on your letterhead—for a copy.

The NATIONAL ACME CO.

170 EAST 131st STREET • CLEVELAND 8, OHIO

Acme-Gridley 4-6 and 8 Spindle Bar and Chucking Automatics • Single Spindle Automatics • Automatic Threading Dies and Taps • The Chronolog • Limit, Motor Starter and Control Station Switches • Solenoids Centrifuges • Contract Manufacturing



There Are

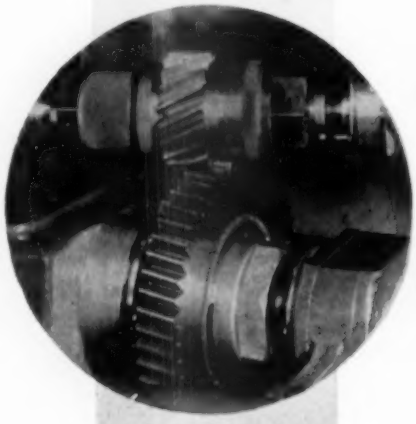
TWO WAYS

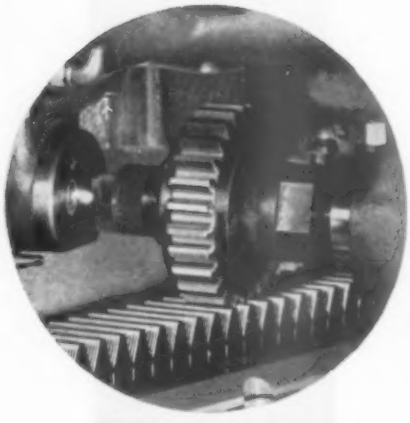
To Obtain

PRECISION GEARS

at

LOW COST





RACK SHAVING:

In high production there is no substitute for rack-shaving either as to precision obtainable or as to cost per gear.

Ask for Bulletin 900

ROTARY SHAVING:

Where varieties of gears in semi-production are to be produced or where quantities are lower, rotary shaving will produce gears at lower cost.

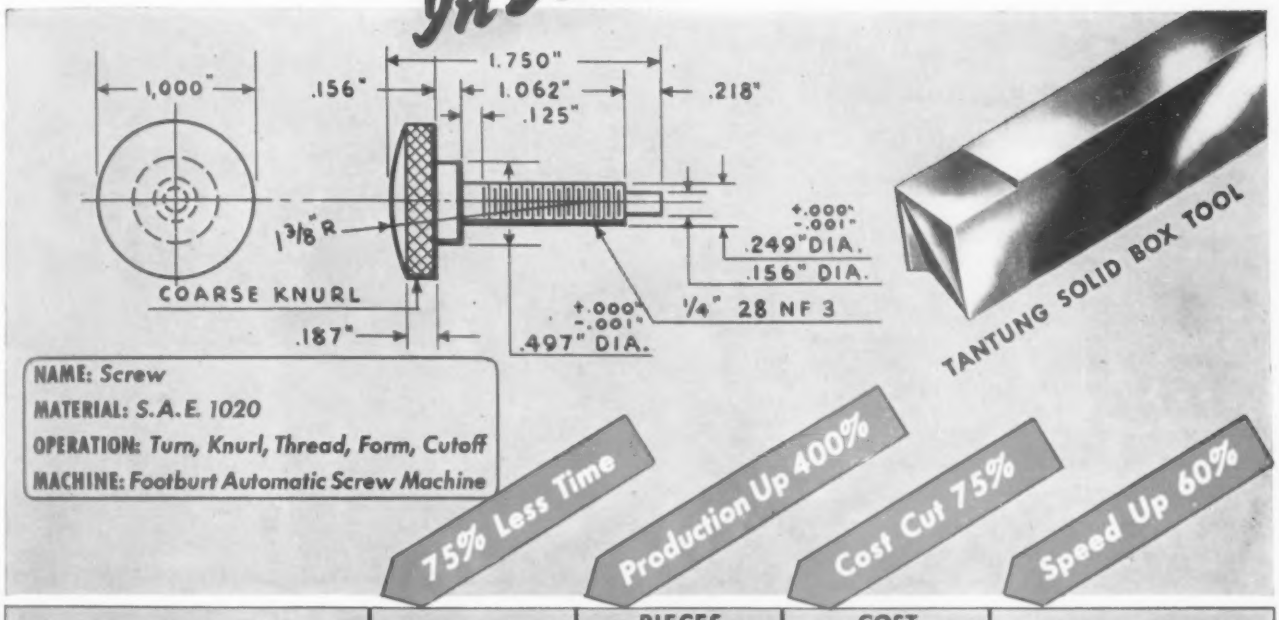
Ask for Bulletin 860

The whole story is told in Manual GF-43 available from

MICHIGAN TOOL COMPANY

7171 E. McNICHOLS ROAD DETROIT 12, U. S. A.

Comparative Performance showing advantages of TANTUNG THE MIRACLE METAL In Screw Machine Operation



TOOLING	ACTUAL TIME	PIECES PER HOUR	COST PER 100 PIECES	SPEED R.P.M.
HIGH-SPEED STEEL	4.30	13.9	$7.17	640
TANTUNG	.95	63.2	1.58	1060

THE ABOVE TEST was made in the plant of a large aircraft manufacturer, under ordinary shop conditions. Tantung tools have demonstrated superiority over high-speed steel tools in thousands of screw machine operations.

Tantung is especially efficient in machining materials which have a tendency to gall or tear, such as stainless steel, aluminum, bronzes, non-ferrous alloys, etc.

Tantung is a hard, tough, cast alloy containing Tantalum-Columbium Carbide. It is the high red hardness of Tantung, greater than any high-speed steel, that enables it to work so efficiently. Send for the free Tantung Catalog.

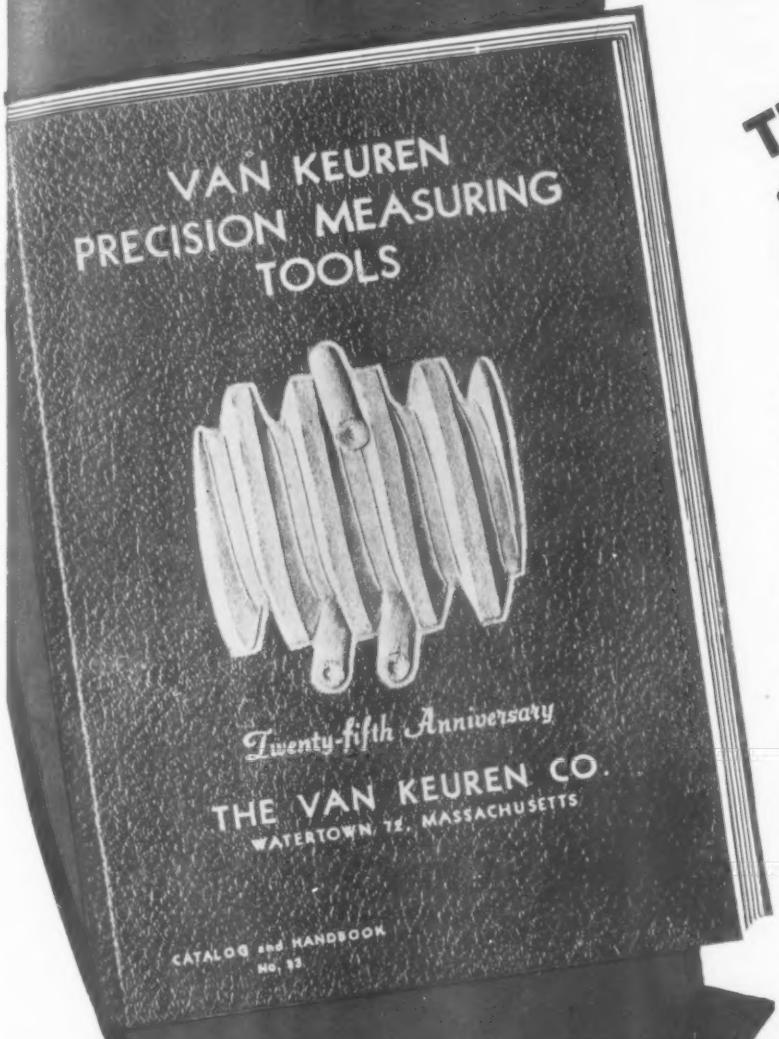
VASCOLOY RAMET CORPORATION

CARBIDE TOOLS AND DIES AND TANTUNG CAST ALLOY TOOLS

4519

NORTH CHICAGO, ILLINOIS • SALES AND SERVICE IN PRINCIPAL CITIES

1945 REVISED EDITION
NOW READY FOR DISTRIBUTION



The NEW Van Keuren CATALOG and HANDBOOK No. 33

This new, revised Technical Catalog and Handbook contains 160 pages of practical, useful information in ready reference form on precision measuring. It describes, by text and illustrations, various accepted methods and equipment for checking accuracy to hundred thousandths and millionths of an inch.

Through the use of the Van Keuren equipment described in this handbook, many outstanding improvements in production and product quality have been attained, and closer tolerances more easily achieved.

PARTIAL LIST OF CONTENTS

NEW PRODUCTS:

New Light Wave Equipment with fused quartz optical flats.
New Laboratory Type Monochromatic Light.
New Solid Square Master Blocks having permanent accuracy..
New and complete Gear Measuring Tables from 5 to 500 teeth.

ENGINEERING DATA

How to measure standard and special screw threads.
Screw Thread data including tables of basic diameters and tap drill sizes for all American threads.
Thread proportions for American and Foreign threads.
Bureau of Standards measuring wire specifications.
How to measure spur and helical gears.
How to measure angles.
How to use optical flats.
Notes on gaging holes.

THE Van Keuren COMPANY
176 WALTHAM ST., WATERTOWN 72, MASS.

Mail Coupon Today for Your Copy

THE VAN KEUREN CO., 176 WALTHAM ST., WATERTOWN 72, MASS.

Kindly send me a copy of your 1945 New and Revised Catalog and Handbook No. 33. It is understood that this request incurs no obligation.

Name .....

Position .....

Company .....

Address .....

ANDY-GRAMS

V-E DAY, with its half victory, initiated activities and greater responsibilities for the tool engineers. Not only must we finish the job started, and at increased tempo so as to expedite total victory and thereby shorten the war, but we must also plunge into the work of reconversion. And that, gentlemen, will be a bigger chore than conversion, when plants were cleared as by a broom of Hercules and all effort concentrated on the one thing—producing the tools of war. Now, war production must go on, and without interruption, the while we prepare for the manufacture of consumer goods.

Old timers, drawn out of retirement as a result of the emergency, would no doubt like to return to the simple life. As, for that matter, men in the prime of life, but who have burned the candle from both ends during the past few years, would like extended respite from the grind. But, it's not to be, except for the lucky few or for those who have burned themselves out in the crucible of industry.

~ ~ ~ ~

AS AFORESAID, we face responsibilities. Millions of our boys will be coming back from overseas, and somehow they must be provided with jobs. Not just something to "keep 'em busy," but useful work at gainful wages. Our fighters have earned, not only their place in the economic sun, but their right to self respect as well. And, as far as jobs are concerned, their reward is largely in the hands of the tool engineers.

As we know, the supply of engineering and technical talent is far below demand, with the situation considerably aggravated because engineering students have been diverted from industrial to the military fields. At the best, several years must elapse before the gap can be filled. In the meanwhile, the deficit must be made up from the ranks of the veteran tool engineers who, perforce, must bear the brunt of reconversion in addition to training eager and ambitious youngsters in the ways of doing things.

As for employment, there'll be plenty of that for several years to come. The problem is to get started, to shorten the period of reconversion. The highly publicized *futurama* is just what the name implies—a vision of the things of the future, not a reality of the moment. In the strict sense, then, reconversion implies resuming the manufacture of '42 models —and believe me, they'll be modern enough for the most of us for some time to come. And, while these goods are in production, we'll adapt the techniques developed during this war to the goods of tomorrow. One thing at a time, lest we lose our grasp on reality.

~ ~ ~ ~

FOR THE A.S.T.E., there is portent of tremendous expansion, not only here in the States, but abroad. Letters from English tool engineers indicate a keen interest in our activities, and, with a sharp trend toward industrialization south of the border, it is only a question of time when Chapters will be chartered in Mexico. And not so long ago, we had a visit from Dr. Umbelino P. Martins, a production minded Brazilian engineer who concluded that the A.S.T.E. just about covered the industrial field. So, it won't be surprising if one of these days, we find ourselves convening in Rio de Janeiro.

~ ~ ~ ~

EARLY LAST YEAR, I was one of a group—the Swedish Engineers Society of Detroit—that entertained a sextette of industrialists from the other side. As a number of the S.E.S. members are also A.S.T.E.ers—past Directors, in fact—there was naturally some sales talk with, I might add, little if any sales resistance.

On the contrary, the visitors were keenly interested in A.S.T.E. activities, with the result that I had requests for detailed information, which was furnished. Since then, there has been some correspondence, finally resulting in a direct approach for inclusion of Swedish tool engineers—and there's plenty of 'em!—in the A.S.T.E. From the looks of things, we're going to be an *international* in a big way.

I mention these things, not only to show trends, but to show that the title—Tool Engineer—was wisely chosen after all. Without tools, there can neither be custom manufacture nor mass production. Tool engineering, then, embraces the entire category of manufacture, with a field of world-wide breadth.

That fact is now becoming so deeply impressed on the public consciousness that, in the United States, Canada, and abroad, the name has come to stand for the ultimate in the Know-How of mass manufacture. And right here, I am going to challenge a contention, by a valued friend, that "civilization is founded on mathematics." It's based on *tools*, without which we could have neither homes nor the appliances of civilization. And, the tool came first!

~ ~ ~ ~

FROM ONE THING to another. I've left the Society H.Q. in the Penobscot Bldg., and am now at the Editorial offices, a few blocks away. The move was necessary, to effect a closer coordination of the editorial staff.

For the benefit of members who may be remote from the hub of our activities, however, I want to say that the few months spent at H.Q. confirmed previous impressions—i.e., that the Society's affairs are in capable hands. Personally, I have worked in few surroundings so utterly harmonious, so devoid of friction. Everybody is working as though the work itself were the main pleasure, not just a means to an end which, in the final analysis, work really is.

~ ~ ~ ~

FRANK WILSON is plugging away at the Handbook and, while the work is painstaking, making excellent headway. It's my guess that, once finished, our "bible" is going to be tops. Anyway, we've picked a good man as editor of the book. And that goes for the rest of the staff, everybody trying to do the best possible job. The point is that, where there is harmony in an organization, there is good management.

Speaking for myself, time has flown on golden wings since coming on the job. In the rush of work, however, my correspondence (always a bottleneck with me) has suffered worse than ever. This relates especially to acknowledgements of material received for publication, a chore largely up to me. But inquiries come in, by mail and 'phone, for Know-How on methods of manufacture and, the times being what they are, these have priority.

I'm telling you this so that, if any of you boys who have contributed material feel that you've been neglected, you'll know who to blame. But, to paraphrase Jim Scott, we've been "up to our necks in alligators," yet, if we are to believe half of the good things said about us, turning out a creditable magazine, regardless. That comes first; as for the rest, bear with us during our "first hundred years."

Andy

GAGES OF PRECISION BY WOODWORTH

ALL the facilities of the N. A. Woodworth Company are directed to one objective . . . the manufacturing of precision gages and tools with the longest accurate life to give the user the lowest possible operating cost.

Increase your production efficiency with sustained accuracy by Woodworth.

* * *

1 Speed up production and reduce costs with the Limitrol. The Limitrol Comparator Type Snap Gage checks errors involving pitch diameter, lead, taper, angle, out-of-roundness. It eliminates "feel" and reduces scrap. Write for Folder 44-L.

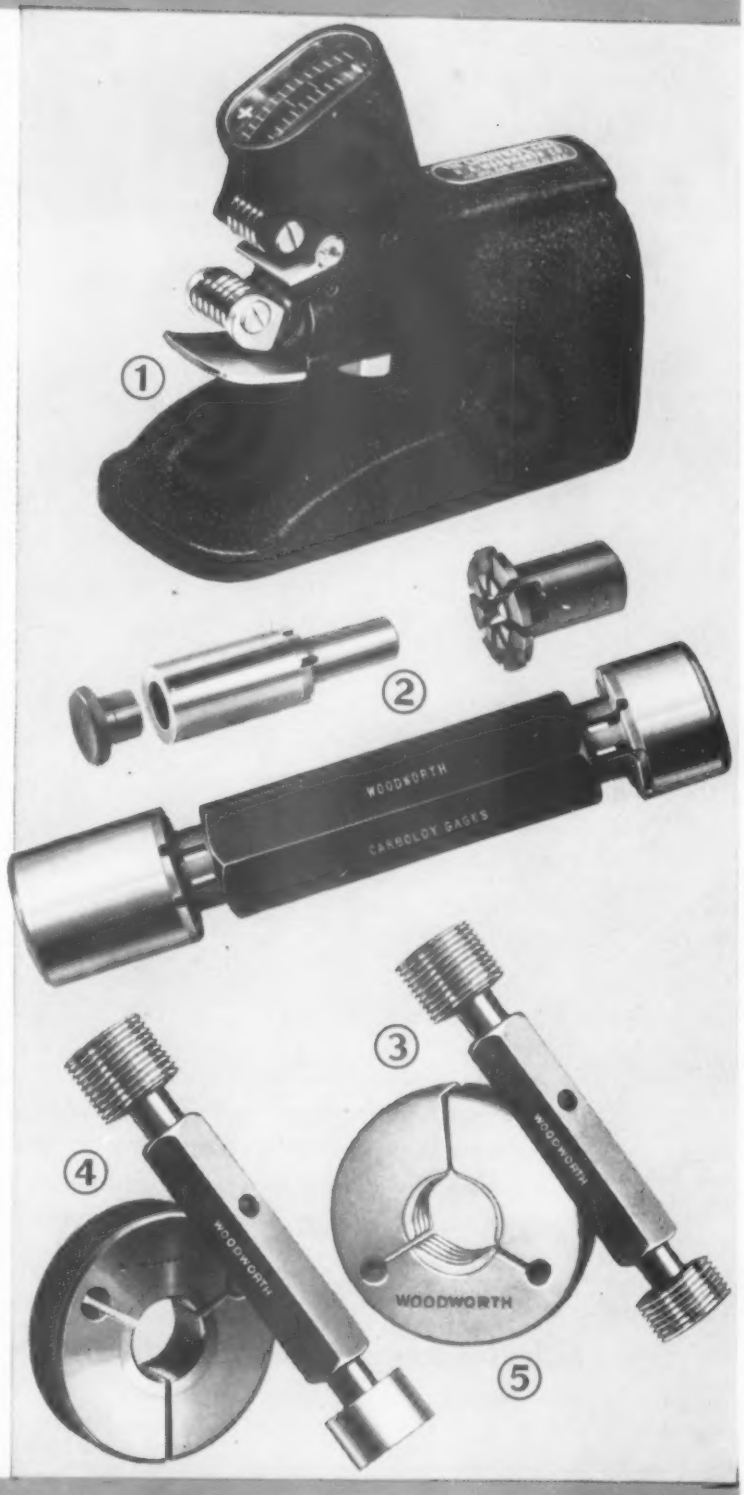
2 Woodworth Carboloy Gages are free from distortions, stresses and strains. Woodworth's exclusive segmented shank compensates for the differences in coefficient of expansion between cemented carbides and steel, thus assuring a trouble-free bond between these two materials. Write for Circular 44-C.

3 Woodworth Durplate Gages are noted for their long life and great accuracy. The Durplate process is exclusively a Woodworth development and confirms the Woodworth slogan, "accuracy you can trust."

4 Woodworth gages of cast Stellite alloy are tough, high wear-resistant . . . have a service life many times that of steel. Gage life is increased from 10 to 20 times. Stellite Cast Alloy Gages are non-corrodible and non-magnetic . . . have a coefficient of expansion close to steel...with other desirable characteristics. Write for Folder 44-S.

5 Gages of Nawlide, a specially processed Woodworth alloy, are outwearing ordinary steel gages many times with no sacrifice in toughness.

ACCURACY YOU W CAN TRUST



WOODWORTH

N. A. WOODWORTH CO., SALES DIVISION, 1300 E. NINE MILE ROAD · DETROIT 20, MICHIGAN

PRECISION GAGES · PRECISION MACHINED PARTS · PRECISION TOOLS

Standard Staggered Side Mills Interlocked and Gauged to Print.

GANG CUTTERS

If you do not find it convenient to phone for one of our service engineers, mail us a blueprint or sketch of your plan and what your production problems are.

Eastern Cutter Service has the facilities plus over 30 years of experience and equipment to solve your gang cutter problems.

The right answer to your high-speed cutter problems, where many pieces are machined in several operations, can be handled more economically in one operation with a series of gang cutters.

The assembly of these cutters is an important task and we would appreciate the privilege to assist you with any of these intricate problems.

Many of your scrap cutters can be saved for gang cutter work by having them recut or redesigned. We can recut, design, reclaim and convert your cutters or from new cutters we will supply for any purpose and according to your specifications. Write for our new catalog showing interesting recommendations for more profits and increased production.

Rendering a Complete High-Speed Steel Tool Service!

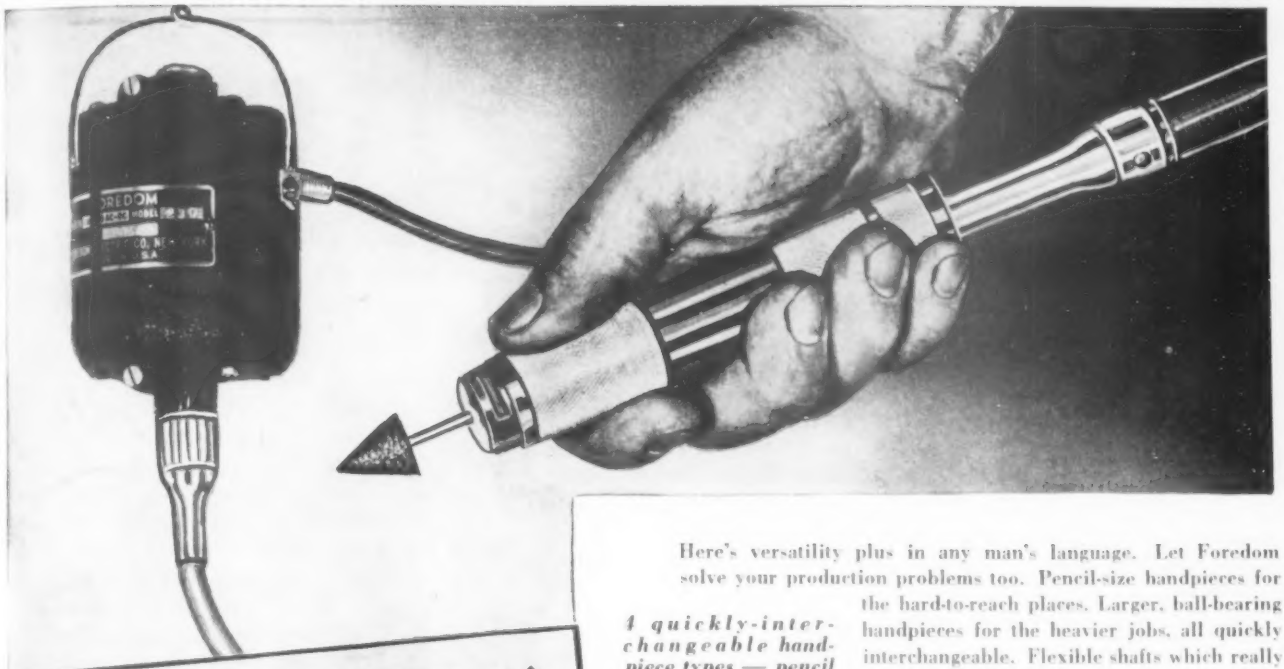
EASTERN CUTTER
CORPORATION
30-32 LITTLETON AVE. NEWARK 7, NEW JERSEY

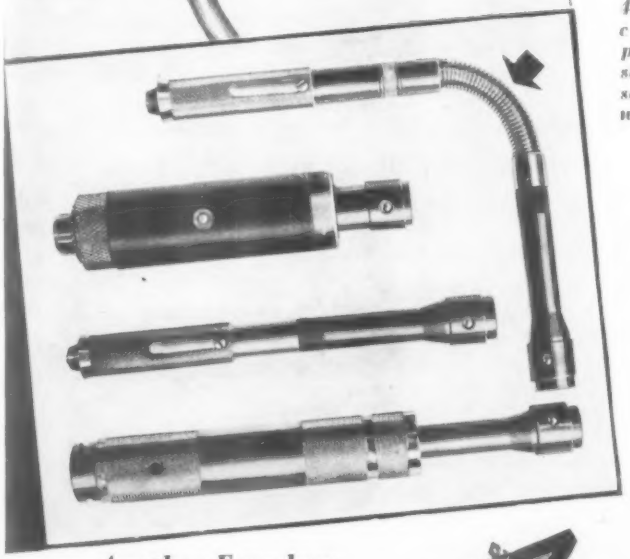
Saving MAN HOURS in thousands of American plants

in the DEBURRING AND FINISHING OF small PARTS

Foredom

FLEXIBLE SHAFT MACHINES





4 quickly-interchangeable handpiece types — pencil sizes and larger — some with flexible wrist—see arrow.

Here's versatility plus in any man's language. Let Foredom solve your production problems too. Pencil-size handpieces for the hard-to-reach places. Larger, ball-bearing handpieces for the heavier jobs, all quickly interchangeable. Flexible shafts which really ARE FLEXIBLE.

3 Ways Right!

1. For de-burring, grinding, finishing, polishing and other light production jobs—particularly valuable on irregularly-shaped parts.
2. In tool and die departments, for grinding, finishing and touching up dies, molds, jigs, etc.
3. For maintenance and emergency needs—touching up set-ups without disassembly, removing high spots on gears, identification marking of equipment, etc.

THOUSANDS OF PLANTS USE FOREDOMS, including Ford, General Motors, Chrysler, Nash-Kelvinator, Jack & Heintz, Sperry Gyroscope, Bendix, Westinghouse, etc.

Models from $17.50 to $48.75. Catalog No. 56 shows a complete line and many uses—may point the way to solving some of today's production and maintenance problems. Write for your copy.

Order from your regular Mill Supply House or direct.

FOREDOM ELECTRIC CO., 27 Park Place, N. Y. 7

Another Foredom Time-Saver

Grinding Kit, Model 111

One of Foredom's complete line of versatile utility grinding kits preferred by so many plants for emergency and maintenance needs. You too will find it pays to spot them liberally about your plant. Pencil-size handpiece facilitates getting into tight corners for touching-up production set-ups. Complete with accessories $23.50.

FOREDOM ELECTRIC CO., 27 Park Place, New York 7, N. Y.

Please send me your new catalog No. 56 showing the different uses of Foredom Flexible Shaft Machines.

Name .....

Address .....

City ..... Zone ..... State .....

★ ★

~~AFTER~~ V-E DAY

Now that V-E *has come!*

HOW WILL YOU USE CHROME PLATING?

Conversion will be gradual after V-E Day because the war will not be finished. Our main effort as well as yours will be directed toward Tokyo. Planning for peacetime production will begin however, and chrome plating should be considered at the earliest stages. Gages, dies and other tools needed will get off to the best start with skilful chrome plating. That's where Hartford Chrome shines, and that's how we're ready to serve you. Your inquiry is invited.

AREA WE SERVE

A Suggestion to Speed Service—

If you need it in a hurry, send it Special Delivery and save valuable days lost in shipping. We'll send it back the same way.

HARTFORD CHROME CORP.

525 PARK STREET • HARTFORD 6, CONNECTICUT • TEL. 2-6868

Licensed by United Chromium Inc.

For Mr. Webster's dictionary . . .

A new definition of fidelity

fi·del'ity (fi·del'i·ti), *n.*; *pl.*—TIES (-tiz). [F. *fidelité*, fr. L. *fidelitas*]. **1.** Faithfulness; adherence to right; careful and exact observance of duty, or discharge of obligations. **2.** *Elec.* The degree to which an electrical device, as a radio receiving set, accurately reproduces at its output end the signal or wave forms received at its input end.

3. *Industry.* That degree of permanent dimensional accuracy through resistance to wear as demonstrated by Elgin-made Sapphire Gages.

INSTANCES:

At Stewart-Warner Corporation—an Elgin Plug Gage, showing less than .00001 inch wear, has delivered over 220,480 close tolerance gagings on a job which wore out *steel* gages, formerly used, after only 300 gagings!

An Elgin *Ring* Gage at the same plant, checking a shaft charged with grinding compound, has now exceeded 328,950 gagings against 150 pieces for high speed steel and 500 for tungsten carbide.

At American Perforator Company—an Elgin Plug Gage, still going strong, has delivered some 520,000 close tolerance gagings over a 14-month period on parts which wore out *steel* gages after only 1 day!

Elgin Sapphire dimensional fidelity saves man-hours, materials, money!

In plant after plant, wherever they are used, Elgin Sapphire Plug and Ring gages are setting new and almost unbelievable records for resistance to wear.

Chemically inert at normal temperatures, their rugged gaging elements of brilliant sapphire do not rust, corrode, burr or become distorted with use.

Approaching the absolute in dimensional fidelity, Elgin Sapphire Gages help eliminate the waste of worn-gage rejects; thus they save man-hours, money and materials.

Elgin Plug Gage sizes: from .030" to .400" and with tolerances as close as XX (± .00001).

Elgin Ring Gage sizes: from .004" to .250" and in tolerances from .00020" down to .00004".

Data on larger sizes, other gaging items, and prices on request.

America's best equipped Sapphire Fabricator

ELGIN NATIONAL WATCH COMPANY
Sapphire Products Division
932 Benton Street
Aurora, Illinois, U. S. A.

Elgin Sapphire Products present many advantages for all these types of equipment: GAGES · THREAD GUIDES · EXTRUSION DIES · KNIFE EDGES · SPRAY NOZZLES · SOFT WIRE DIES · BURNISHING TOOLS · PRESSURE VESSEL WINDOWS · WATCH CRYSTALS · HONING STONES

· ELGIN ·
Sapphire Gages
DIMENSIONAL FIDELITY IN GAGING OPERATIONS

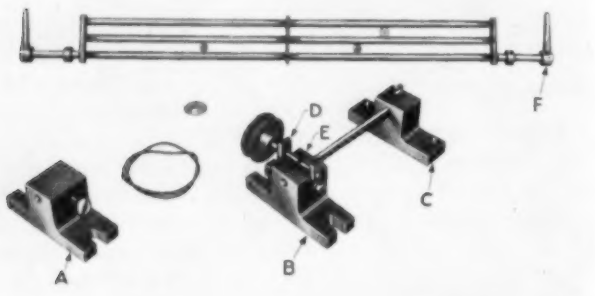
GADGETS

Ingenious Devices and Ideas to Help the Tool Engineer in His Daily Work

Slotting Fixture for Tubing

THIS "GADGET" typifies the ingenuity, necessary in a small shop, to produce simple yet workable tools for unusual jobs at nominal costs. In this case, several hundred feet of tubing required a slot .010" wide x $\frac{1}{32}$" deep. With the device shown, each bar was slotted, end to end, before being cut to the required lengths. These tubes are later assembled, as shown at F, and are used for the assembly and spray painting of discs, which are left to dry in the "cage." The center tube is slotted on both sides 180° apart.

The device consists of three bearings—A, B and C—with a hole the size of the tubing in each. On the center bearing (B), two small adjustable supports—D—are mounted; these act as bearings for an arbor and cutter—E—adjustable for height for cutting slot to correct depth. A Vee pulley, mounted on the arbor, is in turn driven from a Vee pulley on the milling machine arbor.

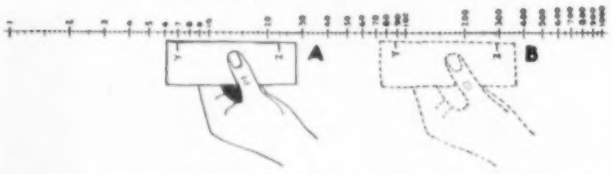


Center bearing (B) is mounted on a long piece of channel iron, which is clamped to the miller table. The tubing is passed through blocks A and B. The tubing is clamped, in block A, when it is near the end of the channel, and clamped with a thumb screw. The cutter is started, and block A moves along the channel, the base keeping the slot parallel with the axis.

When half the length is cut, the other block—C—is tightened and this block is pulled to complete the operation. The center tube (see assembly B) is turned 180°, and the slotting continued. While not shown, it is implied that blocks A and C move, pulling or pushing the tubing through block B, which serves as an auxiliary milling attachment and controls depth of slot.

Walter Pohle, Boston Chapter, ASTE

Handy Computer For Ratios



THE SIMPLE AND handy computer shown can be duplicated on stiff paper, by any draftsman, and will obviate formulas and pencil figuring for ordinary problems that involve ratios. Made from a slide-rule scale, it is applicable to a surprisingly wide variety of situations. For example, it provides a quick method of determining the sizes of two sheaves or pulleys to be used in a drive. It is only necessary to slide a piece of paper from position "B" to position "A".

Thus, if one shaft on a given drive is to run at 88 RPM and the other at 290 RPM, make marks Y and X on a slip of paper, in position B, and opposite the 88 and 290, as indicated. Now, move paper up or down to get any combination of diameters desired. The ratio will always be 88 to 290.

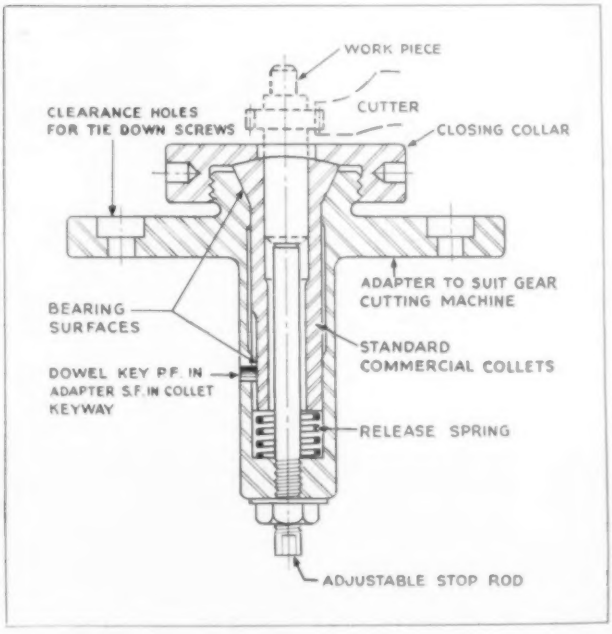
If, for example, one has a 7" pulley that may be suitable for the higher speed, bring the Y mark opposite 7 as in position A. The Z mark then comes opposite 23, very nearly, which would be the diameter of the slower pulley—i.e., the pulley ratios would be 7" and 23". If other diameters are wanted, move the paper to suit.

Inversely, the chart lends itself to the solution of such problems as: Knowing the pulley diameters and the speed of one pulley, what is the speed of the other? This can be worked out by experiment, more or less as one would use a slide rule. As a matter of caution, in figuring ratios of Vee belt drives, use the pitch diameter, not the O.D. of the pulleys.

W. F. Schaphorst, Newark, N.J.

Work Holder for Small Gears

THE WORK HOLDER shown is particularly suitable for the accurate checking of small gears. The shank is accurately turned to fit the work spindle of a gear shaper or a dividing head, as the case may be. The bore, in turn, is accurately machined to take a standard spring collet, the whole accurately and concentrically ground after hardening.



Construction is conventional, and the assembly so clearly illustrated that detailed description would seem superfluous. However, the device has the merit that it can be applied to a miscellany of work.

Frank J. Peragine, New York Chapter, A.S.T.E.

A thousand friends

The popularity of this new Saw Band spread like wildfire through airplane, jeep and motor plants, shipyards, large and small parts factories. Because of it, designers and engineers specify more and more of the new light metals, laminates, plastics and plywoods — metal saw operators double and triple their output.

DoALL Buttress
REG. U. S. PAT. OFF.
THE NEW WIDE-SPACED, HARD TOOTH SAW

This miracle saw requires no re-sharpening, which means no work stoppages. Here's one blading you can well afford to use continuously until worn out and then insert a new one. The Buttress cuts all tough materials, including the following:

Magnesium	Bakelite	Hardwood
Aluminum	Masonite	Softwood
Brass	Zircon	Plywoods
Steels	Butyl	Builders Board
Copper	Saran	Asbestos
Bronze Alloys	Polystyrene	Wood
Kirksite	Micarta	Laminates

Available at all our Supply Points in ⅛", ⅛", ¾" and 1" widths, in various pitches to fit any modern band sawing machine. Write for literature about the Buttress.

FREE
ENGINEERING AID

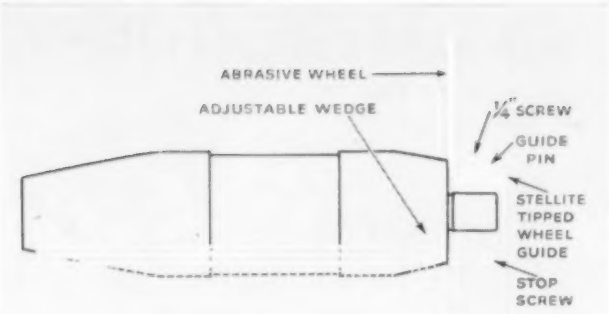
If you have any material hard to cut, send sample to us for sawing recommendations and receive written laboratory report.

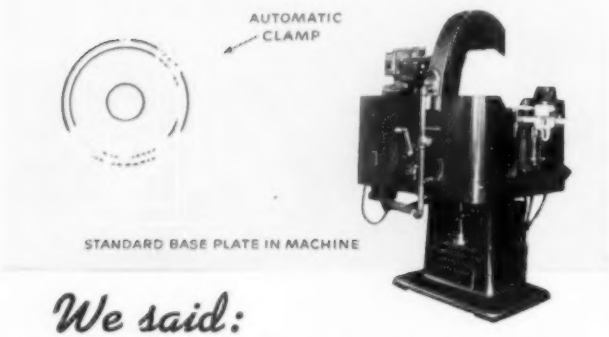
DoALL

INDUSTRY'S NEW SET OF TOOLS

The DoALL Company
234 No. Laurel Avenue • Des Plaines, Illinois

Sales & Service Offices: Baltimore, Birmingham Boston, Buffalo, Chicago, Cincinnati, Cleveland, Dallas, Dayton, Denver, Detroit, El Paso, Erie, Grand Rapids, Hartford, Houston, Indianapolis, Kansas City, Los Angeles, Milwaukee, Minneapolis, New York, Orlando, Philadelphia, Pittsburgh, Providence, Reading, Rochester, Rockford. St. Louis, San Francisco, Seattle, Statesville, Syracuse, Toledo, Tulsa.





We said:

"WHY NOT CUT IT ABRASIVELY?"

and here's what happened:

PROBLEM: To remove boss from closed end of shells. Conventional methods would require a second operation to finish end after removal of boss.

SOLUTION: CAMPBELL engineers recommended Model 213 Hydraulic with a simple fixture as shown in drawing. Facing tool makes undercut on boss to guide wheel through cut. Guide eliminates flutter in wheel. Shell is fed to work stop in fixture. Single hydraulic control handle operates clamp, and controls up and down feed of wheel. No special skill required by operator.

RESULT: Finished cut in one operation. Additional finishing operation eliminated. Wheel contact time for 1 inch boss—6 seconds. Fixture reduces handling time to a minimum.

* * *

Perhaps your cutting problem is not as simple as this one. We are constantly adapting CAMPBELL machines for unusual jobs—or to do ordinary jobs faster, better or at lower cost.

WHY NOT DO THIS? *Write and tell us (1) the range of sizes, (2) kind of material, (3) length of cutoff pieces, (4) length of stock before cutting, (5) tolerance for length of cut pieces and (6) hourly production requirement. With this information,* CAMPBELL *engineers can recommend production procedure and work up cost sheets for you.*

Campbell

ABRASIVE CUTTING MACHINES

ACCO

ALSO MAKERS OF A COMPLETE LINE OF NIBBLING MACHINES

ANDREW C. CAMPBELL DIVISION
AMERICAN CHAIN & CABLE
BRIDGEPORT, CONN.

TRADE MARK

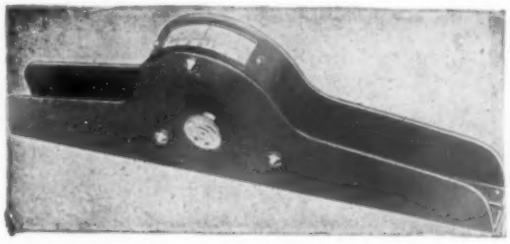
Where Accuracy Counts . . . the

CLINOMETER

DIRECT — READING

VERNIER ANGLE GAUGE

Provides Desired Exactness EASILY and SIMPLY



Angle gage with a simplicity, accuracy and flexibility not available in any other type of angle measuring device. Outstanding among its exclusive features and advantages are:

DIRECT READING—Employing the gravity principle, the Clinometer indicates an exact angle on the accurately etched graduated scale. Reading is facilitated by the magnifying glass.

VERNIER SCALE—Whole degrees are measured on the main dial; minutes are indicated on the Vernier scale.

ABSOLUTE MEASUREMENT—Clinometer shows the true angle of the measured surface with relation to the absolute horizontal plane.

FULL MEASURING RANGE—Measuring range of 0° to 360° is permitted. Moving rotor has 360 graduations: 0-180° in black, 180-0° in red. Direct reading can be made of any angle in any position, including overhead applications, and without auxiliary equipment.

SELF CHECKING—Accuracy of instrument itself, at any reading, can be checked by placing Clinometer on the same surface, first—leftside high; then, right side high—both angles (readings) must be the same, one on the red scale, the other on the black scale. Figure 0 on the main drum is always high.

ACCURACY—Reading accuracy is one minute. Instrument has been tested to a precision of 7½ seconds.

RAPIDITY OF READING—Pendulum movement of rotor can be slowed or stopped by the knob thumbscrew brake. After drum has come to rest and is locked, instrument may be taken off measured surface to read dial.

PREVENTS ERROR—Clinometer is simple to understand. Readings can be made by even semi-skilled or inexperienced workers; so accurate it will eliminate errors and disputes; so rapid in operation, it will frequently double speed of inspection.

PRACTICAL—Clinometer is sturdy, light, simple in construction, unaffected by shocks or vibration. Conveniently carried and ready for immediate use.

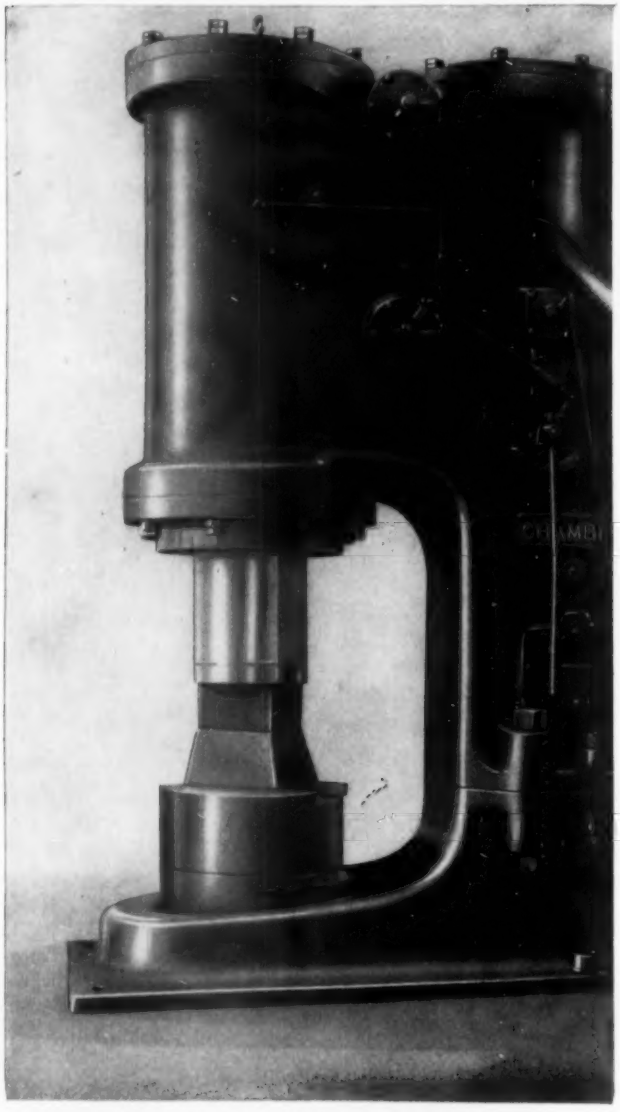
MODEL A	MODEL B	MODEL C
Base 14" x 1½", height 4½", weight 2¾ lbs. approx.	Base 6" x ½", height 4½", weight 1¾ lbs. approx.	Length (over straight edge) 14"; width overall 2 7/16"; height (over trammel-pins) 5"; weight 2 lbs. Two trammel pins furnished.

All Models Furnished in Special Instrument Case

Write for Prices and Further Details

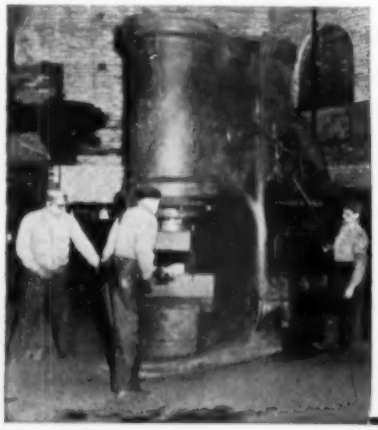
ACME TOOL CO.

194 CHURCH ST. : NEW YORK 13, N. Y.



A SELF-CONTAINED MOTOR-DRIVEN PNEUMATIC HAMMER THAT IS INDEPENDENT OF STEAM OR AIR LINES

The Chambersburg Pneumatic Forging Hammer is of the self-contained type having a built-in compressor. The ram is driven up and down by flexible pneumatic force, created by the compressor piston, which is driven by an electric motor of high speed through 2-stage speed reduction gearing. The hammer can be started instantly and strikes a constant number of blows, heavy or light, at the will of the operator.



Write for Bulletin 1275

Chambersburg Engineering Co.

Chambersburg, Pa.

MULTIPLY MILLING MACHINE UTILITY *with* Glenzer ADAPTERS

Utility Tools

These Adapters provide your Brown & Sharpe and Jarno tapers and spindles with Morse taper holes to receive Glenzer Utility Sleeves, for holding and driving Woodruff Key Slot Cutters, End Mills and other tools.

FOR TRUE-RUNNING CUTTER EFFICIENCY, TRY ONE OF THESE ADAPTERS IN YOUR SHOP

Send for File B with complete data illustrated

THE J. C. GLENZER CO., Inc.
6467 EPWORTH BLVD. DETROIT 10, MICH.

GOOD READING

A Guide to Articles of Interest and Significance in the Trade Press

Quantity Production and Checking of Parts Requiring Compound Angles. In two parts, April and May *Machinery*, by Frederick W. Plapp. A well considered, illustrated article on the tooling, production and checking of intricate parts having simple or compound angles.

Die-Grams: Karl L. Bues in April *Western Machinery & Steel World*. A short but illuminating article on a progressive holding fixture that is applicable to a wide variety of work. Incidentally, Mr. Bues, who is a consulting engineer, has long been active in A.S.T.E. work.

Aluminum Press Forgings: Frank Oliver in May 17 *Iron Age*. A well illustrated article describing the manufacture of forged aluminum aircraft engine cylinder heads at the Chevrolet-Anderson plant exemplifies some of the techniques of press forging of large components. Some of the practices were worked out on other aircraft parts while awaiting the go-ahead on the job for which an unusual array of heavy press equipment was installed.

The Reaction Engine: G. Edward Pendray in May *Popular Science*. A timely article that, dealing with Sir Isaac Newton's third law of motion, dispels many misconceptions regarding rocket power. Since the jet propelled plane is demonstrably efficient and the only practical solution to stratosphere flight, one may assume a general acceptance in the near future. As that portends tooling, we may well acquaint ourselves with the basic principles of the jet engine. Anyway, the article is interesting reading in itself.

Also, by the same author: "*The Coming Age of Rocket Power*," *Harper (Bros.)*, Magazine, out May 23rd.

Friction Sawing, by Arthur A. Schwartz of Bell Aircraft. A bulletin, obtainable from the Tannewitz Works, Grand Rapids 4, Michigan, which describes the remarkably fast method of friction sawing now possible with high speed band saws.

For Every One You Write, Arrange Two: by Harry W. Smith, Jr., in May *Industrial Marketing*. Part two of an analysis of technical news handling, the article discusses the pet peeves of technical editors regarding publicity releases. These include releases not in the field of publication; old stuff disguised as new; too frequent mention of company name, thereby subordinating the product; and, releases written to pad the vanity of company executives. Of general interest to the editorial and advertising fields.

Bulletins and Trade Literature

Perfection Tool & Metal Heat Treating Co., 1740 West Hubbard Street, Chicago 22, Illinois, have just issued an interesting booklet called **"Fifty Facts."** It cites actual experience in fifty manufacturing plants, showing how more than half of the tools in common use may be made to work longer and better through the use of (a) new and better ways of hardening soft steels and (b) a supplementary treatment called "AD-LIFE" for previously hardened, finished tools. Even brand new tools can be "Ad-Lifed." Since no rehardening is required, there is no danger of fracture or distortion. Tools thus treated have been found to stand longer runs between grinds.

~ ~ ~ ~

A 16 page booklet, describing **Helix end mills,** is now available from National Twist Drill & Tool Co., Rochester, Mich. These tools are designed for milling slots, keyways and pockets where ordinary arbor type milling cutters cannot be used. Because of the high helix angle of their cutting edges, and the general free cutting construction, they operate smoothly and efficiently even at high speeds.

~ ~ ~ ~

The Cincinnati Milling Machine Co., Cincinnati 9, Ohio, has issued two new Bulletins—M-1387 and M-1389—describing **Cincinnati Duplex Vertical and Single Ram Hydro-Broach Machines,** respectively. In addition to illustrations and specifications, the Bulletins highlight features of design.

~ ~ ~ ~

A new technical bulletin, describing Vickers **Pilot Valves,** is now available from *Vickers, Inc.*, 1400 Oakman Blvd., Detroit 32. The valves, which are for use as initial or sequential control of other valves or elements in hydraulic power systems, are fully described along with suggested installation and application diagrams.

Bulletin VAS-45, describing its standard line of **improved Single-Ram broaching machines,** scientifically designed for surface broaching, is now available from *Colonial Broach Company*, P. O. Box 37, Harper Station, Detroit 13.

Another Bulletin (VAD-44) describes the Colonial line of improved **Dual Ram broaching machines.** Like the single ram machine of similar capacities and strokes, the dual ram machines are especially designed for continuous output, combined with high precision, on surface broaching.

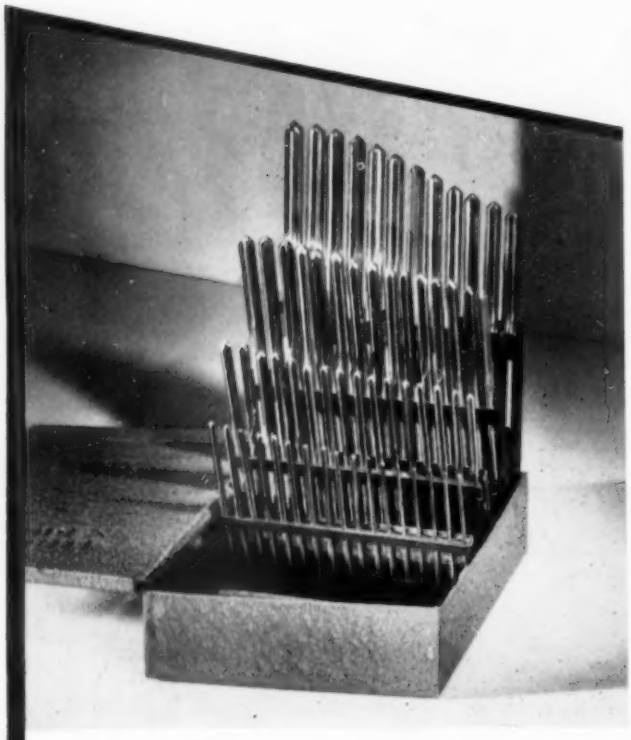
~ ~ ~ ~

While frankly stated as advertising, a series of **instruction sheets on screw machine cam design** are not only instructive but of perennial interest. These sheets are published by George L. Detterbeck Company, Inc., 1871 Clybourn Ave., Chicago 14, and are sent out, at approximately two week intervals, without charge to those interested in the screw machine field.

The sheets include typical problems and their solution, speeds and feeds, and cam layout forms, and follow the method developed by the Detterbeck Company—which, incidentally, is a prominent manufacturer of cams and tools for screw machines—in previous instruction courses in cam design. To all practical purposes, then, these sheets constitute a correspondence course in cam design for automatic screw machines.

~ ~ ~ ~

Stock Bulletin No. 137, recently published by *Tungsten Carbide Tool Company*, 2661 Joy Rd., Detroit 6, describes the company's line of **carbide tipped machine centers.** These centers are listed in Morse Tapers No. 1 through 5, in B & S, No. 7 through 11, and in Jarno No. 4 through 12. All are tipped with Carboloy grade 44A carbide, and popular sizes are available for immediate shipment.



A Standful of Better Production

This matched set of sixty L & I Ground Flute Reamers in Wire Gage sizes is only part of the L & I Line of Better Reamers.

They're better, because L & I specializes in ground flute reamers — ground *after* the solid bar is heat-treated and uniformly hardened. This gives a perfect cutting edge that stands up far longer than ordinary milled flute reamers.

Because we're "Specialists in Small Reamers," we ship from stock Machine Reamers by 64's from $\frac{1}{16}$" to $\frac{5}{16}$" and Wire Gage sizes 1 through 60, as well as Taper Pin Reamers from 7/0 to #4.

Place a trial order today and join the long list of leaders who are cutting costs and improving work quality with L & I Ground Flute Reamers.

LAVALLEE & IDE, INC.

CHICOPEE, MASSACHUSETTS

2

L&I GROUND FLUTE REAMERS

SIMPLICITY . . . EASE OF CHANGE From Internal to External Makes

PARKER-MAJESTIC

LEADER IN THE GRINDING FIELD

★

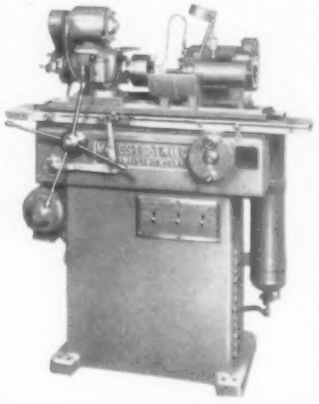
For Precision Grinding

Features . . .

- HAND OR POWER FEED . . . . . .
- DEAD AND LIVE CENTER DRIVE . . . .
- OSCILLATING TABLE ACTION . . . .
- COOLANT FILTERING . . . . . .

Send for Descriptive Circular

Representatives in All Principal Cities



PM **MAJESTIC TOOL & MFG. CO.**

147 JOS. CAMPAU • DETROIT 7, MICHIGAN

Work is held securely in fixture for milling operation by a De-Sta-Co 210 Clamp. This shows how the solid work bar can be bent to any desired clamping angle without the necessity of special tooling or parts.

De-Sta-Co Toggle Clamps are designed to simplify and expedite many production and assembly operations. Especially suited for jig and fixture building.

Complete range of types and sizes described in New Catalog No. 45. *Send for it.*

DETROIT STAMPING CO.

Established 30 Years

328 Midland Ave • Detroit 3, Mich.

Index of Tool Engineer Advertisers

June, 1945

The "Priceless" Ingredient of CONTINENTAL Cutting Tools...

EXPERIENCE

IN the practical work of production, there is no substitute for experience. For twenty-six years Continental Tool Works has been designing and producing special and semi-standard cutting tools to customers' drawings or part prints . . . the Continental name in the cutting tool field is now used as another word for "accuracy and quality". This long experience, coupled with the most modern and complete facilities, makes Continental the first choice as a cutting tool source. Find out how Continental can help assure you of high production efficiency. Get in touch with Continental Tool Works, or its local representative.

CONTINENTAL TOOL WORKS

Division of Ex-Cell-O Corporation

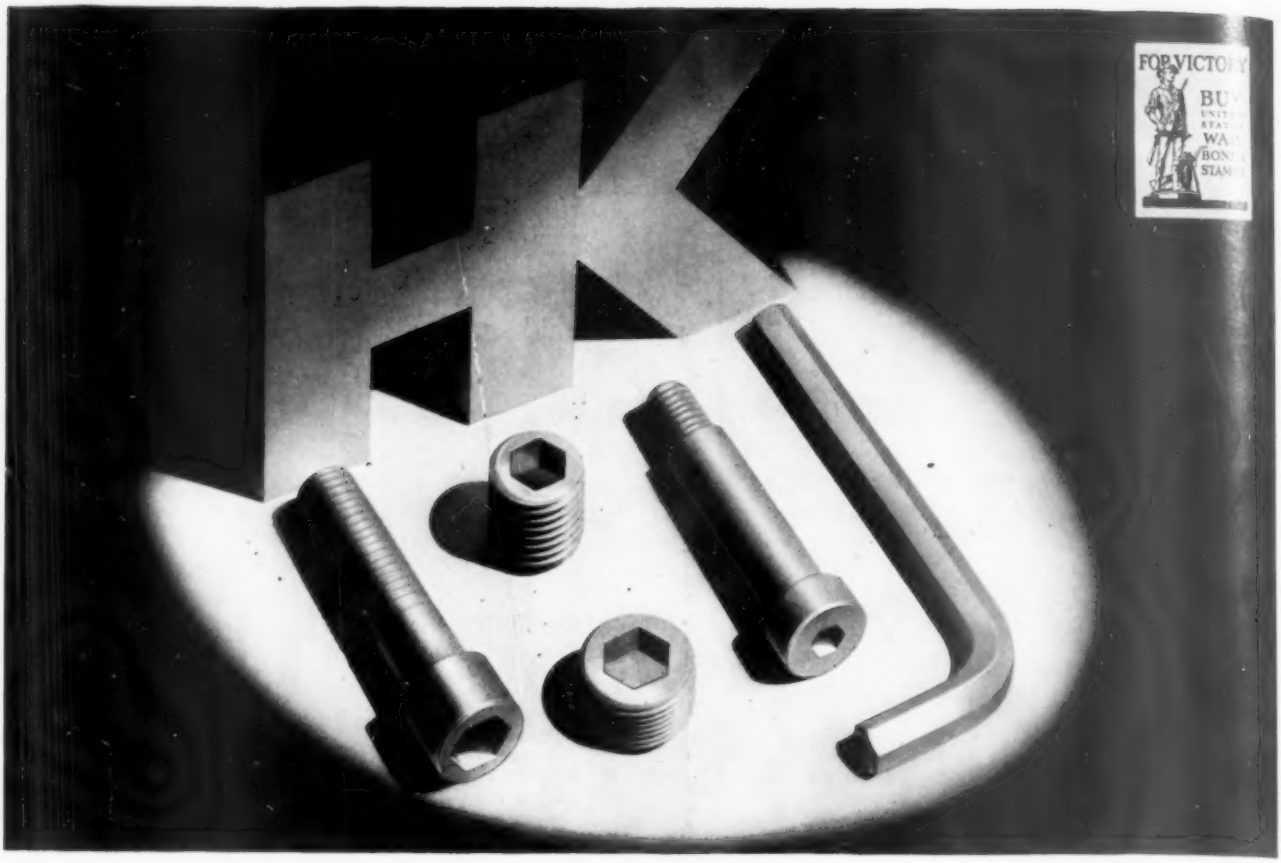
DETROIT 6, MICHIGAN

45—65

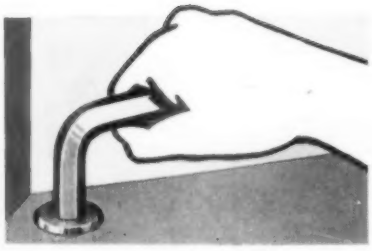
CONTINENTAL TOOL WORKS
CTW
EX-CELL-O CORPORATION

Continental
CUTTING TOOLS

- Boring Bars and Tools
- Broaches
  Broach Pullers
  Broaching Fixtures
- Core Drills
- Counterbores and Countersinks
- CTW Drive Holders
- Counterbores (Tool Room Sets)
- Counterbore Pilots
- Inserted Blade Cutters
- Carbide Tipped Cutters
- Form Relieved Cutters
- Milling Cutters
- Thread Milling Cutters
- End Mills
- Side Mills
- High Speed Steel Reamers
- Carbide Tipped Reamers
- Shell Reamers
- Inverted Spotfacers
- High Speed Steel Tool Bits
- Carbide Tipped Tool Bits
- Circular Form Tools
- Cut-off Tools
- Flat Form Tools
- Dovetail Form Tools



SOCKET SCREWS
by HOLO-KROME



You can SAVE
. . . . WEIGHT
ALSO SPACE &
ASSEMBLY TIME

Internal Wrenching!

It's quick and positive! Designs are made more compact because of this better fastening method. Members to be fastened are reduced in size, fastening locations are closer to corners and edges, weight and space are saved. Production assembly lines move with more speed and efficiency. Industrial war production records prove **Holo-Krome FIBRO FORGED SOCKET SCREWS**—the Completely Cold Forged Screws—to be the better fastening method. It's the Internal Wrenching! . . . Your Industrial Supplies Distributor has the facts—ask him!

THE **HOLO-KROME** SCREW CORP.
fibro forged **SOCKET SCREWS**

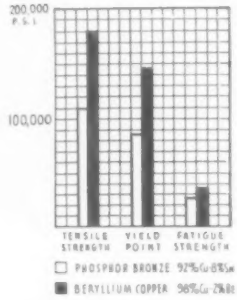
HARTFORD 10, CONN., U.S.A.

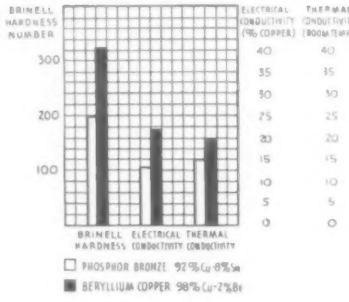
An Exclusive Holo-Krome Product

BERYLLIUM COPPER SCREW BLANK MACHINED IN 8½ SECONDS

New Britains Boost Vital Production 500% On B-29 Superfortress Engine Part

Beryllium Copper Screws, used as tube connections for the fuel injection system of a B-29 engine, help to accomplish the feats of these modern air battlewagons . . . bringing destruction and devastation to our enemies.





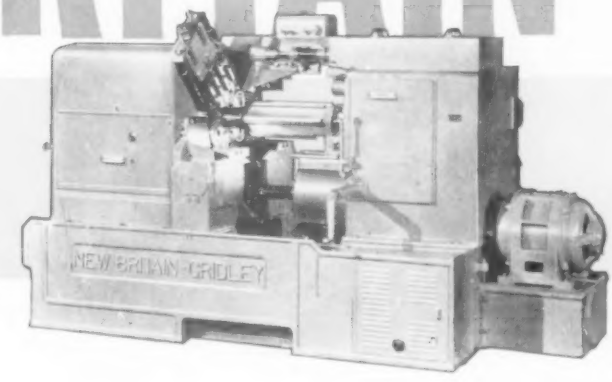
The strategic war metal Beryllium has proved its superiority when combined with copper . . . an alloy possessing the mechanical qualities of strength and hardness of steel plus the conductivity and corrosion resistance of copper. Today's airplanes, tanks, ships, engines, instruments and communications equipment are dependent upon Beryllium Copper parts for superlative performance.

To meet the demands for B-29 bombers, parts manufacturers were called upon to step up production. A small but vital engine screw required forty-two seconds to complete the first operation on an automatic screw machine. New Britain engineering resources were tapped for the answer with the result that a New Britain now completes a finished Beryllium Copper screw blank every eight-and-one-half seconds . . . or 513 pieces gross per hour. The hardness of this alloy is C-18-22 Rockwell and machined at 260 feet per minute with spindle speeds of 1492 R.P.M. Due to the rigidity of New Britain slides, the average life of the carbide tipped tools runs 3500 to 4000 pieces per grind.

This New Britain speed and machining efficiency has not been approached with any other type of automatic and these same practices may readily apply to your present or postwar production. The automatic solution to your metal working problems can be supplied when consulting the New Britain Sales-Engineer in your area . . . or, should you prefer, write direct.

NEW BRITAIN

THE NEW BRITAIN MACHINE COMPANY
NEW BRITAIN, CONNECTICUT
New Britain-Gridley Machine Division



M-01014

TURNING QUESTIONS *Answered!*

WHY A THRUST LOCK TAILSTOCK?

Because it incorporates an ingenious automatic control that also acts as a fool-proof lock. This control, operating on the worm and gear principle, enables the spindle to be run to position and held there without further locking or clamping. The spindle is extra long with a full accurate bearing almost the entire length of the tailstock. The off-angle of the hand-wheel allows bar stock to pass through the spindle hole. The thrust-lock tailstock is another outstanding LeBlond feature.

★

SINCE 1887

the world has been turning to LeBlond for turning equipment.

★

WRITE FOR CATALOG!

LEBLOND FIELD ENGINEERS ARE AT YOUR SERVICE to help you in your development work, particularly along the lines of the difficult, the "out of the ordinary" turning problems. The accumulated knowledge of every manufacturing trend in good times and bad—peace and war—gained over a period of nearly 60 years from thousands of installations all over the world, is yours for the asking. Contact our nearest dealer or write Dept. FE46.

★ YOUR BONDS BUY BOMBS ★
BUY A "BLOCK-BUSTER" TODAY!

THE R. K. Le BLOND MACHINE TOOL CO., CINCINNATI 8, OHIO, U. S. A.

NEW YORK 6, Singer Bldg., 149 Broadway, WOrth 2-0722
CHICAGO 6, 20 North Wacker Drive, STA 5561

LARGEST MANUFACTURER OF A COMPLETE LINE OF LATHES